

THE JOURNAL OF THE Department of Agriculture.

VOLUME V,
No. 6.

WELLINGTON, N.Z.,
16TH DEC., 1912.

PRICE,
SIXPENCE.

GRASS - GRUBS.

THE SMALL GREEN COCKCHAFER: SOME NOTES ON ITS
LIFE-HISTORY.

A. H. COCKAYNE.

THE life-histories of our indigenous lamellicorn beetles belonging to the cockchafer group (*Melolonthidæ*), which in the larval, or grub, stage cause such widespread destruction to grassed lands, many cereal crops, and gardens, are very imperfectly known. In the majority of cases the imago, or beetle, stage is the only one that has been described, and the larvæ of many of them are not known at all. Up to the present, with very few exceptions, no attempt whatever has been made to distinguish the various species when in the larval and pupal stages. A complete knowledge of the various cockchafers in all their stages and a full ecological consideration of each species are essential. Until this has been obtained it is impossible to tell with any degree of accuracy which species are really of any economic importance. Again, the wider

the knowledge brought to bear on the life-histories and the habits of our chafers the easier will be the framing of feasible methods for their successful control.

THE COCKCHAFFERS.

In New Zealand all the cockchafers are popularly known as "white," or "grass," grubs. Five genera are known to occur here, of which *Odontria* and *Pyronota* have the largest number of representatives, twenty species of *Odontria* and fourteen of *Pyronota* having been described. In these two genera only one species (*Odontria zealandica*) has had the larval and pupal stages described.

The destruction caused by white grubs is very extensive, and the monetary loss occasioned by them far exceeds that caused by any other insect in New Zealand. Even in seasons when there are but few complaints concerning their prevalence they can be found in very large numbers. It has been customary to attribute almost the whole of this damage to the single species *Odontria zealandica*. This brown beetle is a very familiar insect during the months of November and December, when it can be observed flying about in large numbers with a loud buzzing noise just after dusk. The beetles are night fliers only, and often feed extensively on the leaves of numerous plants, causing quite severe injury.* It has been suggested that other species of *Odontria* may also cause considerable harm, but this idea, although probably quite correct, has been based only upon the fact that the beetles of several species are common in certain localities, and not on a study of their life-histories. It is assumed that, being closely related, their development will in all likelihood be identical with that of the ordinary brown beetle, and their habits of feeding on the roots of plants be the same. It is manifest that such reasoning is at best mere guesswork. It is only by careful experiments and detailed field observations that any reliable evidence can be secured.

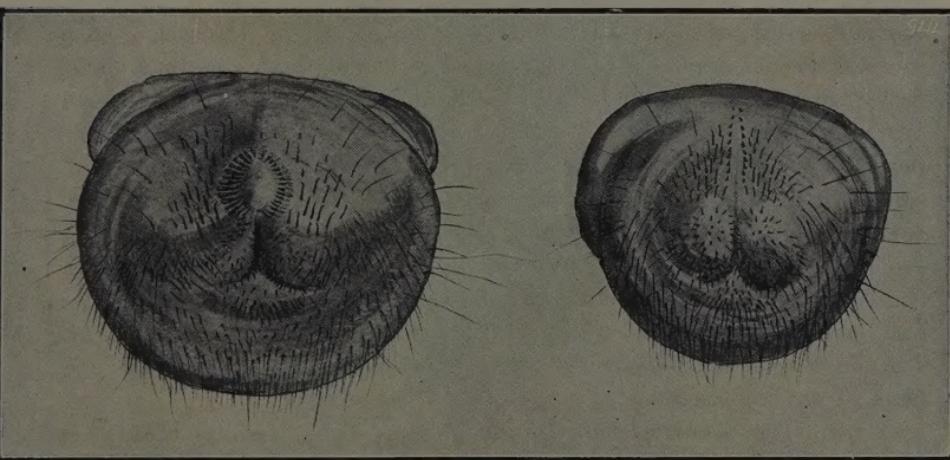
THE LITTLE GREEN COCKCHAFER AS A GRASS-GRUB.

From time to time it has been asserted by farmers that the extremely common green cockchafer (*Pyronota festiva*), so abundant on manuka during the summer months, was the cause of considerable depredations in permanent pasture in certain localities. As, however, the larva of this beetle was not known, economic entomologists have entirely neglected the study of this insect and have considered it of no economic importance. During the study of the New Zealand cockchafers that is being undertaken by me and my assistant, Mr. E. H.

* It is important to ascertain all the plants on which these beetles feed, and especially those which they are most prone to attack. The feasibility of growing and spraying trap crops will to a large extent depend on such knowledge.

Atkinson, it has become abundantly manifest that this insect may be the cause in certain localities of a good deal of the damage that has previously been attributed to *Odontria zealandica*, especially on land that originally consisted of forest or scrub and has been converted into permanent pasture.

During last May, in the vicinity of Wellington, a considerable area of surface-sown land that has been in pasture for many years was seen to be seriously affected with the larvæ of a lamellicorn. This land, which was hilly, rising to an altitude of 1,200 ft., was utilized as sheep pasture. The grass covering consisted chiefly of *Agrostis vulgaris*, *Danthonia semiannularis*, *D. pilosa*, and *Anthoxanthum odoratum*. The grubs were found in fairly definite patches, varying from 2 ft. to 10 ft. in diameter, the patches being quite close together and in many cases coalescing, leaving little islands of unaffected pasture. The number of grubs per square foot varied from ten to seventy, the grubs being at an average depth of $2\frac{1}{2}$ in., and the turf could be rolled up with the hand, just as if it had been cut with a turf-cutter. From this description it can be well understood that I was of the opinion that the damage was caused by the ordinary grass-grub, *Odontria zealandica*, as the effects were exactly similar to those caused by the grubs of that beetle. Larvæ were collected from the affected patches each week from the first week in September, and at that date only grubs were present. On the 20th October the first pupæ were noted. It was then seen that the insect causing the damage was not *Odontria*, but the green cockchafer, *Pyronota festiva*, the presence in the pupæ of the long spine of the sternal process extending from the point of attachment of the fore legs clearly showing that they did not belong to the genus



No. 1.

No. 2.

ANAL SEGMENTS OF *ODONTRIA ZEALANDICA* (No. 1) AND *PYRONOTA FESTIVA* (No. 2),
SHOWING DIFFERENCE IN ARRANGEMENT OF BRISTLES. (See page 584.)

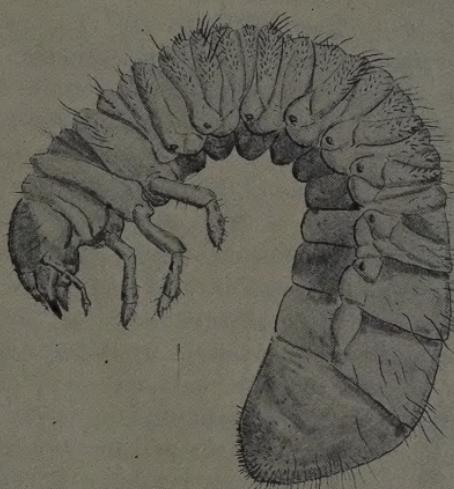
Odontria. The first beetles were noticed on the 3rd November, and at the present time nearly all have reached the imago stage, although there are still both larvæ and pupæ to be found in certain patches, especially those that slope towards the south.

DESCRIPTION OF THE VARIOUS STAGES OF PYRONOTA.

As the larval and pupal stages of *Pyronota festiva* have not hitherto been described, an account of these stages is of interest. Hudson, in his "Manual of New Zealand Entomology," page 28, says, "A small lamellicorn grub found amongst refuse in manuka thickets is probably the larva of *Pyronota*." But, as he never bred out the larvæ, it is not certain whether the grub referred to really belonged to *Pyronota* or not.

Larva.—The larva of *P. festiva* is a milk-white or bluish-white grub, averaging 1·6 cm. in length by 0·35 cm. in breadth. Except when it is crawling, the larva is never seen extended to its full length, its usual position being with the posterior portion of the abdomen curved round and lying parallel to the thorax. The head is a pale yellowish-brown, smooth and shining, with a few scattered dark-brown bristles. The tips of the jaws are also dark brown or almost black. The thorax, which is hardly distinguishable from the abdomen at this stage, consists of three segments, each of which bears a pair of short and rather hairy legs. The abdomen, which consists of ten segments, is thickened posteriorly, the eighth and ninth segments being the deepest. The tenth tapers rather suddenly into a blunt point. Each of the first eight segments bears a pair of yellowish spiracles, one on each side, and situated about midway between the dorsal and ventral surfaces. The segments are extremely difficult to differentiate on the upper surface, owing to their being irregularly corrugated. The abdomen is provided with two distinct types of hairs: (1) a transverse strip confined to the upper part of each corrugation of short and thick dark-brown bristles, (2) long and thin yellowish hairs irregularly scattered over the upper surface and sides. The distribution of hairs on the tenth, or anal, segment is very characteristic. On the ventral surface, extending from just forward of the apex, are two parallel rows, close together, of very short and thick bristles, which project almost horizontally from the surface and are directed inwards. On either side of this double row is a patch of bristles much longer and with hooked tips, which extends to the apex of the segment. The dorsal surface is covered with backwardly directed bristles and hairs of varying length.

Pupa.—The average length of the pupa is 1 cm., and its breadth is 0·45 cm. The general colour is similar to that of the larva, but with usually a more decided yellowish tinge. In the pupa stage the mouth parts, antennæ, eyes, legs, and wing-cases of the future beetle are



LARVA OF PYRONOTA FESTIVA.
(First Stage.)



PUPA OF PYRONOTA FESTIVA.
(Second Stage.)

distinctly visible. The legs lie folded beneath the insect, with the tips of each pair touching. The wing-cases are conspicuous between the middle and hind pairs of legs. Between the two opposite wing-cases on the ventral surface is the characteristic sternal process, which consists of a plate ending posteriorly at the level of the tips of the middle pair of legs. At this end it terminates in two short horns, while the anterior end is prolonged into a spine, which reaches to the base of the fore legs. In the early stages the abdomen ends in a peculiar club-shaped process, which, however, is partially absorbed as the pupa matures. The cast-off larval skin often persists and forms a cap over the last segment. In the pupa nine abdominal segments can be seen on the dorsal surface and six on the ventral.

Beetle.—The imago, or beetle, averages 0.9 cm. in length by 0.45 cm. in breadth. It is of approximately the same shape as the pupa, but the abdomen is now entirely covered by the elytra, or wing-cases. These, together with the head and thorax, are of a brilliant metallic-green colour, which shows red in certain lights. The sternal process is very distinct, and its presence at once separates *Pyronota* from any of the species of *Odontria*. Unlike *Odontria*, the beetle is diurnal in its habits.

HOW TO DISTINGUISH BETWEEN PYRONOTA AND ODONTRIA LARVÆ.

The investigations so far undertaken have shown the urgent necessity of being able to distinguish at sight the differences that may exist between

the larvæ of all our lamellicorns that are found damaging the roots of plants. Until reliable methods of determining the various species when in the grub condition have been ascertained the value of field observations will be much impaired. In order to secure sufficient data for this purpose it will be necessary to have all the species isolated when in the beetle stage, and have them kept under close examination.



BEETLE OF PYRONOTA FESTIVA.
(Third Stage.)

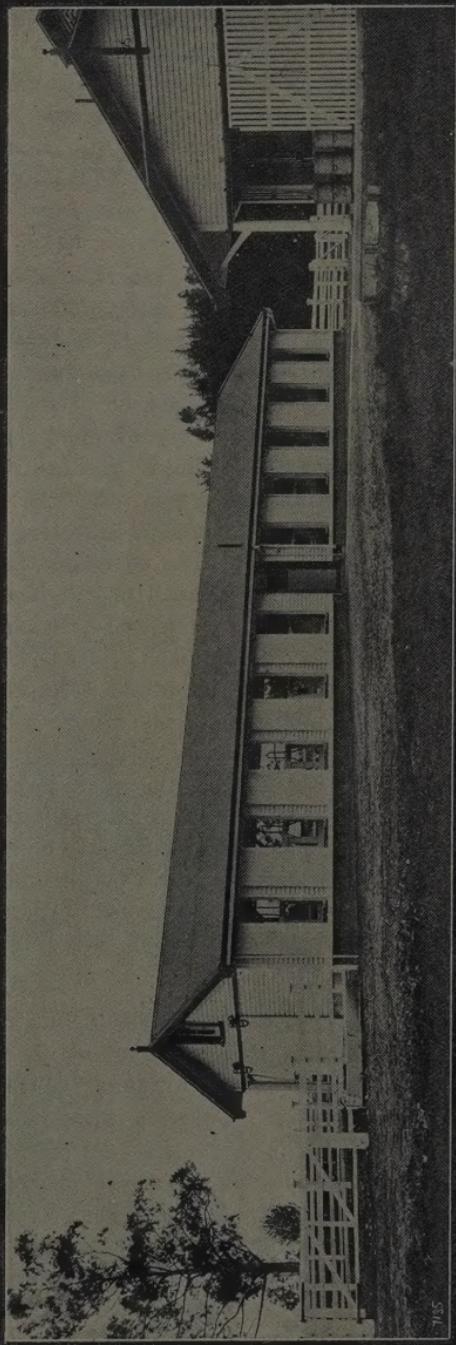
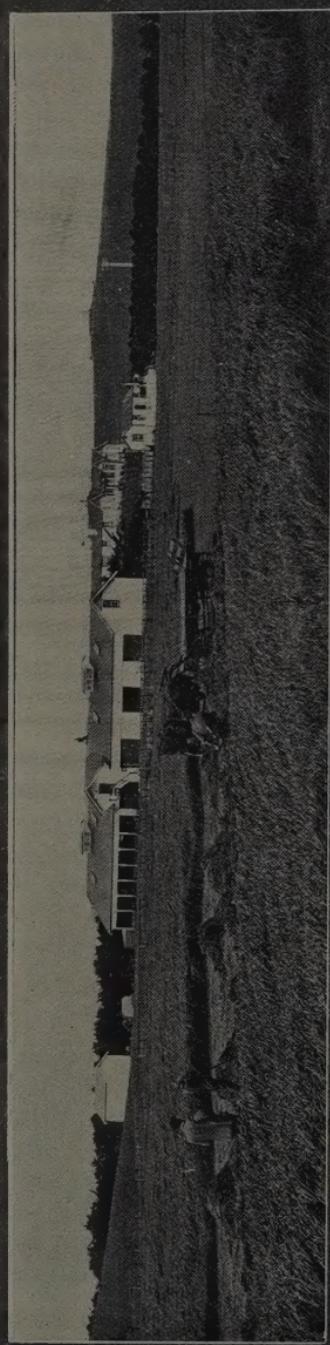
tion throughout the whole of their development right from the laying of the eggs. Arrangements for carrying out this important work on a sufficiently extensive scale have been set on foot, and it is hoped that a commencement will be made with certain of the species during the present season. In this way not only will the individual life-histories be accurately determined, but also important data are likely to be secured on the range of variability of each species and the validity of many that have been described from what is really quite inadequate material.

In the work done on *Pyronota festiva* it has been shown that the larvæ differ markedly from those of *Odontria zealandica*. This, of course, refers to the fully developed larvæ, and it has yet to be determined whether the distinction holds good during the whole of the development of this stage. The arrangement of the bristles on the last abdominal (anal) segment of the larvæ of the lamellicorn beetles that have been examined appears to indicate that it can be employed to distinguish between the different genera. In the case of *Pyronota festiva* and *Odontria zealandica*, larvæ that are of approximately the same size, the difference is so apparent as to enable any one to distinguish them at once with the aid of a small magnifying-glass. On the ventral surface of the anal segment of *Odontria zealandica* is a single row of straight stout bristles arranged like a horse-shoe, with the opening situated right at the terminal end of the segment. These bristles do not stand out at right angles like the others with which the anal segment is clothed, but slope inwards. In *Pyronota festiva* there is no horse-shoe formation at all, but on the ventral surface of the segment there are two rows of parallel bristles on each side of the median line, much shorter and thinner than in *Odontria zealandica*: like those of *Odontria*, they slope inwards towards one another. This difference affords a very ready means of distinguishing between the larvæ of these two beetles. Its value in making field observations can be well understood.

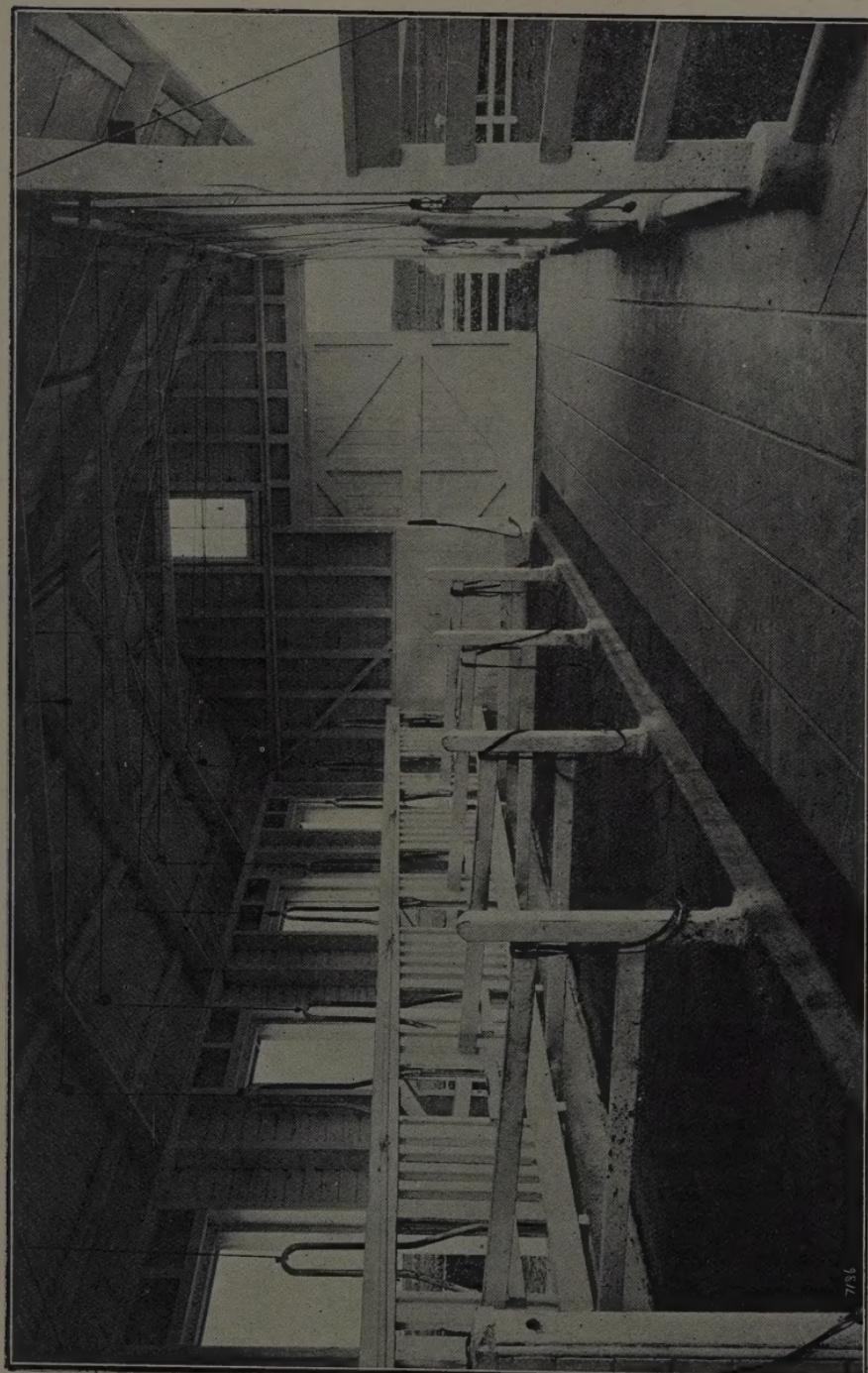
ECONOMIC POSITION OF PYRONOTA.

It is probable that *Pyronota festiva* will be found to be quite an important grass pest in a number of localities, as it is certainly the commonest of our beetles in many districts in New Zealand. The discovery that the larvæ feed on the roots of grasses on land that has been laid down in permanent pasture is an important one, and it is now necessary to determine the area that is affected by this insect. It is more than likely that much of the damage caused to grass in recently bush-burnt country, previously attributed to *Odontria*, will be found to be due to the little green cockchafer.

The drawings illustrating this article, made from living specimens, are from the pen of Mr. E. H. Atkinson.



THE HOMESTEAD, OFFICE, AND STABLES (TOP). THE COW-BYRE AND DAIRY (BOTTOM).



INTERIOR OF THE COW BYRE.

THE DAIRY COW.

ITS FEEDING AND MANAGEMENT.

PRIMROSE McCONNELL.

INFLUENCE OF FEED.

It must be admitted that a cow not born a milker can never be made so by any system of feeding, also that no system of feeding can increase the percentage of fat in the milk; as a matter of fact, if the milk-yield is increased by high feeding the percentage of butter-fat is often decreased. Experiments carried out at the Ruakura Farm of Instruction during last summer and the present spring confirm this. On the other hand, the quality of dairy-produce—butter in particular—is undoubtedly greatly affected by the nature of the feed. An exceptionally rich pasture will never yield a good quality of butter, and it is well known that the finest butter in Britain is the produce of cows which graze on the herbage of some of the poorest of clay soils. Of the artificial foods, cotton-cake and beanmeal head the list as feeds responsible for the very best quality of butter and cheese, the former specially influencing firmness in texture and excellence of flavour. On the other hand, linseed- and linseed cakes induce butter of an oily nature and flavour, and if fed to the milk cow at all must be fed in very small quantities, although, as far as the health of the cow is concerned, no better food can be given.

CULLING IMPERATIV.

In building up a dairy herd of great milking-capacity it is necessary for the dairyman to realize that the quickest way to that end is by culling the "robber" or "boarder" cows—that it is only a millionaire dairyman who can afford to buy scrub bulls at fifty shillings per head—and also that it is only cows of great milking-capacity which will pay for a little extra feed; while, on the contrary, the more he feeds the "boarders" the less will be his net profit. He must also realize that a good yield cannot be expected from a cow which comes to her period of lactation in poor condition.

IMPORTANCE OF PUREBREDS.

As to the respective value of the various milking breeds, this is too delicate a matter to discuss, but of this I am certain: it is much



A RUAKURA JERSEY—RUBY'S BUTTERCUP.
First and champion at Hamilton Show and first and reserve at Auckland Show.



ANOTHER RUAKURA JERSEY—MAYFLOWER.
Second at Hamilton and Auckland Shows.

easier to improve the milking-qualities of a pure breed than it is to make a breed and improve it. I am also quite certain that more profit can be made on a small farm from a small pure herd than from a large herd of mongrels, even though it has to be admitted that some of the greatest producers are crosses.

If we look carefully into the merits of the various breeds we will invariably find that the greatest butter-fat producers are natives of a comparatively warm and genial climate, and that the breeds which yield a large but poor quality of milk are natives of a comparatively cold climate. This would seem to indicate that the energy required to keep up the heat of the body in a cold climate would in a warmer climate go to the production of butter-fat. Of course, I do not mean to infer that by simply transferring a Holstein cow to the Channel Islands you can bring her milk up to the standard of the Jersey, because the inherent qualities of the Jersey or Holstein are not the result of a day but of many generations, and any change of this nature brought about by a change of climate must necessarily be very slow. At the same time this should impress upon us the fact that the ensuring of the bodily comfort of the cow by reasonable shelter is almost of as great importance as suitable feed. It is, of course, true that a breed which yields comparatively poor milk can be greatly improved in that direction by careful selection, although no system of feeding will be effectual. As an illustration of the latter fact I may instance Lord Rothschild's dairy cow which was originally placed first in London for the best dairy cow this season, and, although undoubtedly well fed, was disqualified because her milk was below the assumed standard. A noted authority states, "My belief, after thirty years' experience as a milk-producer, is that food has little or no influence on the richness of the milk—it will increase the quantity, but not the quality."

THE BALANCED-RATION IDEA.

With reference to a finely balanced ration, my own opinion is that as far as the milk cow is concerned it is not of such vital importance as many would lead us to believe. Mr. C. Crowther, Lecturer on Agricultural Chemistry, at Leeds University, and author of "Milk Investigations at Garforth," concludes a very able article on "rations" by stating that "In the present state of our knowledge, 'standards' or other rules for the compounding of rations can only serve to supplement intelligent observation and the judicious application on the part of the feeder of practical experience."

"Balanced" rations are of greater importance when highly concentrated food in large quantities is being given, as is usual among the dairy herds of Britain; but we in New Zealand have to pay such

a high price for this class of feed that it is only in very exceptional cases it can be fed profitably. Thus the first object of the New Zealand farmer should be to produce on his own farm everything which his dairy cows consume. In summer a good pasture is all that is necessary for profitable milk-production, and any extra feed that may be given, in nine cases out of ten, is not fed profitably. Although it is possible to slightly increase the yield, the value of the increase is more than balanced by the extra cost of the feed.

THE BEST SYSTEM FOR NEW ZEALAND.

The aim of the dairy-farmer should be to feed profitably, and this cannot be accomplished either by a starvation diet on the one hand or by a too liberal diet on the other. He must, of course, be prepared to face periods of drought, and, failing lucerne, must grow forage crops



DOMINION GEM.

A young member of the Ruakura Jersey herd.

that will fill the place of pasture in such an emergency. In growing these crops he should mix the legume with the non-legume, as this is not only better feed for his cows, but it is also better for his soil. Apart from lucerne, no feed that I know of is equal to oats and tares, and, as far as my experience in New Zealand goes, the winter tares succeed better than any other variety. Two other good mixtures are millet and peas, and maize and peas. These crops should be sown at intervals, so that they may be cut in succession. The drawback to all such crops is the labour in connection with them. For each

crop the land must be ploughed, thoroughly cultivated, manured, and seed provided and sown.

Is there any remedy? Undoubtedly there is, and that remedy is lucerne. A good stand once secured, it remains for years with little or no expense in the way of cultivation. With a good lucerne-paddock the dairy-farmer may defy any drought, for when his pastures dry up he can provide feed in abundance and of the very highest quality. On previous occasions I have said much in favour of this plant, and the more I see of it the more do I fall in love with it. A most striking instance of the incalculable value of lucerne has just been brought to my notice. Previous to the great Australian drought which commenced in 1902 one large squatter had almost brought himself to bankruptcy by the cost of irrigating 300 acres and laying it down to lucerne; in fact, he was such a great enthusiast over irrigation and lucerne-growing that his neighbours looked upon him as a mild kind of crank. The result was that at the end of the drought his 300 acres of lucerne had not only saved the whole of his flock, but had also enabled him to buy up his neighbours' starving sheep and fatten and sell them at an enormous profit. During one month of the drought the lucerne-paddock carried an average of 75 sheep per acre, and, whereas at the beginning of the drought the squatter in question was in a bankrupt condition, by the end of it he had made a handsome fortune. On the other hand, a neighbour who owned 225,000 of the famous Waganella merinos, worth £2 per head, although he spent a total of over £1 per sheep in the purchase of hay, &c., lost 125,000 head, and the end was disaster. Surely no further instances will be needed to convince the dairy-farmer of the fabulous value of this plant.

For winter cow-feeding nothing more is necessary than a good supply of hay and a few roots—mangels and lucerne hay for preference—and, as previously stated, it is essential to bring the cow to her calving-time in good condition. A cow which is starved during winter cannot possibly give a good record the following season.

GENTLENESS AN ESSENTIAL.

Another item which is absolutely essential in good dairy management is gentleness in handling the cows, for if the herd is abused in any manner no system of feeding will make it produce to its utmost capacity.

Foot-and-mouth Disease.—The Commonwealth Government, by a Proclamation dated 2nd November, 1912, has modified its former Proclamation prohibiting the importation of straw or hay for fodder purposes from any country in the direction of excluding New Zealand from such prohibition.

CONTAGIOUS MAMMITIS.

EXAMINATION OF SUSPECTED MILK AT WALLACEVILLE.

C. J. REAKES, D.V.Sc., M.R.C.V.S.

A SHORT note in the *Journal* of September, 1911, page 212, relative to contagious mammitis—in which instructions were given to farmers as to the method of sending samples to the Wallaceville Laboratory for examination to determine whether the cows from which the samples were taken were or were not affected with contagious mammitis—has had the effect of causing a very large number of milk-samples to be sent in for examination. This is very satisfactory, as it enables the Department to get into direct touch with farmers who are unfortunate enough to have this disease among their stock, and to furnish them with advice as to the treatment of affected animals. It is hoped dairy-farmers will continue to take advantage of the facilities offered by the Department to aid them in combating this and other diseases among their herds. There is one point, however, which I would be very glad if they would bear in mind: this is, to send milk-samples whenever conveniently possible early in the week, so that they will not arrive on Saturdays. Milk, being a perishable article, must necessarily be examined as quickly as possible after it comes to hand. As many specimens come in large parcels which are not delivered by the first mail in the morning, it means that if these reach Wellington early on Saturdays they are not delivered at the Laboratory till later in the day, after the general staff have departed for the week-end. This means an excess of Sunday work for the officer who has to remain. Sometimes the sample is quite spoilt through lying in the post-office in Wellington till the Monday. Another point which should be remembered is that in sending specimens of milk for examination for contagious mammitis, or any other suspected disease, *no preservative of any kind should be added*, as the presence of this will prevent an accurate result being obtained from the bacteriological examination. The essential thing to do is to make sure that the milk is secured under absolutely cleanly conditions, and that no risk of outside contamination, by accidental dirt, or air-borne germs, is incurred.

OUR PUREBRED SHEEP.

POSITION OF STUD FLOCKS IN NEW ZEALAND.

JOHN LINTON, Feilding.

ABSTRACT FROM SHEEP RETURNS, 1912, SHOWING TREND OF BREEDING
BY COMPARING THE STUD-SHEEP RETURNS WITH THOSE OF THE
PREVIOUS YEAR, 1911.

Breed.	Breeding ewes.	Increase.	Decrease.	Flock Rams, 2-tooth and over.	Increase.	Decrease.	Rams, now 2-tooth.	Increase.	Decrease.	Stud Rams.	Increase.	Decrease.
Merino . . .	2,268	..	703	4,443	..	1,036	428	..	941	308	74	..
Lincoln . . .	28,403	..	314	33,825	..	789	9,721	..	309	2,399	..	1,325
Romney . . .	64,984	11,120	..	95,364	12,431	..	23,839	2,973	..	6,254	1,700	..
B. Leicester . . .	3,936	..	811	4,755	..	706	1,564	..	500	458	104	..
E. Leicester . . .	4,564	..	1,235	5,623	..	1,198	1,554	..	405	493	..	28
Shropshire . . .	2,313	..	688	2,236	..	196	632	..	209	233	..	148
Southdown . . .	7,681	1,048	..	9,243	942	..	2,771	501	..	902	264	..
Other breeds . . .	1,930	80	..	3,252	294	..	470	..	64	139	..	38
Totals, 1912	116,079	12,248	3,751	158,741	13,667	3,925	40,979	3,474	2,428	11,186	2,142	1,536
" 1911	107,582	..	..	148,999	..	..	39,933	..	..	10,580	..	..
				8,497	..	..	9,742	..	1,046	..	..	606

South Island.

Merino ..	18,672	2,327	..	14,549	..	1,188	3,353	..	68	552	8	..
Lincoln ..	3,048	..	1,442	3,381	248	..	1,172	..	474	206	..	257
Romney ..	23,984	..	1,479	27,551	3,222	..	8,378	..	618	1,194	..	216
B. Leicester	25,485	..	1,218	28,838	..	2,333	8,929	..	1,286	1,327	..	153
E. Leicester	24,715	..	2,762	31,337	..	657	7,881	..	2,007	946	..	698
Shropshire	5,127	..	2,025	4,708	..	1,106	1,549	..	651	179	..	116
Southdown	4,461	746	..	1,955	341	..	1,301	..	155	156	42	..
Other breeds	11,211	429	..	19,373	1,541	..	4,198	7	..	409	..	336
Totals, 1912	116,703	3,502	8,926	131,692	5,352	5,284	36,761	..	75,259	4,969	50,1	776
," 1911	122,127	..	..	131,624	..	..	42,013	..	..	6,695	..	..
	..	..	5,424	..	68	..	..	..	5,252	..	..	1,726

THE RESPECTIVE STANDING OF THE BREEDS.

Figures compiled from the latest issues of the Flock-books (Four).

Breed.	Number of Flocks.	Breeding ewes.	Increase.	Decrease.	Rams, now 2-tooth.	Increase.	Decrease.
<i>North Island.</i>							
Romney ..	226	28,703	675	..	12,015	748	..
Lincoln ..	87	13,449	..	1,088	5,158	338	..
E. Leicester ..	24	3,184	..	415	1,127	..	306
B. Leicester ..	17	1,438	..	319	625	..	207
Southdown ..	63	5,627	580	..	2,256	149	..
Shropshire ..	13	759	..	667	258	..	211
Ryeland ..	1	26	..	11	6	..	8
South Devon ..	1	32	4	..	17	5	..
Totals, 1912 ..	432	53,218	1,259	2,500	21,462	1,240	732
.. 1911 ..	418	54,570	..	..	20,998	..	..
<i>South Island.</i>							
Romney ..	101	17,727	..	87	6,817	703	..
Lincoln ..	24	2,596	..	808	1,109	..	347
E. Leicester ..	134	18,869	..	4,423	7,861	..	1,437
B. Leicester ..	172	19,713	..	2,229	8,206	..	1,701
Southdown ..	45	4,238	1,060	..	1,387	207	..
Shropshire ..	42	3,921	..	2,430	1,533	..	586
Merino ..	17	7,480	66	..	1,971	..	219
Ryeland ..	6	353	90	..	130	43	..
Corriedale ..	20	9,228	657	..	3,180	40	..
Total, 1912 ..	561	84,125	1,873	9,977	32,194	993	4,290
.. 1911 ..	570	83,747	..	..	32,376	..	..
Half-bred ..	1	3,337	..	598	1,480	..	570

Some explanation is necessary with regard to the tables of flock-book sheep, especially those of the South Island. In the first place, previous to this I have been unable to procure a copy of the South Island Flock-book for the year in time to publish in December, therefore I have been compelled to work out the results for the previous year. However, Vol. viii (1912) has come to hand, so that the increases and decreases in the accompanying table for the South Island are really the work of two years, which accounts for the large figures. I may say that the differences are fairly equally divided in the two years. It will also be seen that Corriedale-breeders are now sending in returns, and are now well forward in rank, as are owners of half-bred flocks. It will also be noticed that Cheviots, Oxford Downs, and Dorset Horns have been dropped out of the South Island Flock-book, while merinos, Hampshires, and Dorset Horns have disappeared from the North Island book. This is regrettable, if the owners are keeping them pure, as there should be a natural habitat for any of these in the Dominion. There was also a flock of Roscommons that disappeared from the North Island book two years

ago. It should be mentioned that there are now four sheep-breeders' associations, and that the flock-books used in the compilation of the above figures are: Romney Marsh, Vol. viii—1912; New Zealand Sheep-breeders' (North Island), Vol. xi—1911; New Zealand Sheep-breeders' (South Island), Vol. viii—1912; and New Zealand Lincoln Flock-book, Vol. i—1911. These are the latest issues. Although the North Island and Lincoln books bear last year's date, they supply exactly the same information—namely, the number of lambs kept as rams and ewes put to ram in 1911.

ANTIQUITY OF AGRICULTURE.

WHEN our ancestors were untutored savages agriculture in China was at an advanced stage indeed. The knowledge of agriculture possessed by the ancient Chinese seems at this distance of time almost incredible. The popular ballads of China, three thousand years old, selected from the writings of Confucius, contain many stories and poems on the agriculture of that time. Some of these have been translated from Chinese into English by the Rev. W. Jennings, M.A. Here is a Chinese song of "harvest home" three thousand years old :—

Clear the witch-grass, clear the scrub ;
Ploughs the soddened soil shall grub ;
Thousand couples weed the ground,
Crossing swampy field and bound ;
There the master, there the son,
Younger sons—aye, every one.
Strong men here, assistants there,
Hear them o'er their (midday) fare.
Husbands eye their wives with pride,
Wives cling to their husbands' side.
Now the sharpened shares are in—
On south acres they begin.
Sown is grain of every kind,
Living germs in all enshrined.
Bursting now in faultless rows,
Succulent and tall it grows.
'Mid the young and thriving grain
Weeders wade, a numerous train.
Last the reapers, band on band,
Pile the produce on the land,
Till the stacks unnumbered stand.



THE STUD RAMS AT THE RUAKURA FARM OF INSTRUCTION.

LUCERNE ON PUMICE COUNTRY.

J. DUNCAN.

IN the centre of the North Island there is a vast area of poor pumice country, some two to three million acres in extent, of a type of soil of a most unusual character, and thereby presenting a complex problem for solution before such country can be profitably utilized. For some time it was thought that the land was worthless, but experiments initiated by the Fields Division of the Department of Agriculture, Industries, and Commerce go to indicate that this idle territory is capable of being turned to good account. How this can best be done is a matter deserving of our best effort. Experiment must precede demonstration—and experiment not merely in small favoured localities, but carried on over large typical tracts of country. The experiments so far conducted indicate that there is present a not inconsiderable amount of latent plant-food in these pumice lands, lands which, however, demand careful treatment and nursing if they are to be made permanently valuable. Analyses show that the soil in the majority of instances contains a fair amount of potash, phosphoric acid, and lime, but—in contradistinction to the bulk of our soils—is deficient in nitrogen. The mechanical condition is excellent, particularly in regard to its capillarity. Being wanting in nitrogen, and at the same time demanding humus, a means of effecting improvement is suggested in the growth and ploughing-in of such leguminous plants as clovers, lupin, broom, &c. These, with assistance from artificial fertilizers, do exceedingly well in the pumice medium, and therefore an apparently easy solution is provided of bringing these lands without great delay into a profitable condition. The importance of utilizing the first growth for ploughing-in on such country cannot be emphasized too strongly. Certainly a season will be thereby lost, but this will mean permanent rather than mere temporary success.

One experiment being conducted, allied to a great extent with the process of ploughing-in nitrogen-collecting plants, is that of growing lucerne. This is being done on fairly high country, some 650 ft. above the sea-level—a sandy loam of a pumiceous and siliceous nature. In testing lucerne in this environment, it was naturally thought that this greatest of all the legumes would automatically provide the desired nitrogen, and at the same time supply, by means of its wonderful rooting-system, a good binding and humus-creating medium. This



Ten Months' Root of Lucerne
in Pumice Soil.

apparently will prove to be the case. The results so far are most encouraging, and point to definite success, with this reservation: that the lucerne receives the careful treatment it demands, especially under conditions such as these, where a stand is not quickly secured.

There are three essentials in the successful establishment of lucerne—drainage, humus, and lime. On pumice lands there is a natural drainage; the humus must, however, be supplied (by ploughing-in green crops); and lime being present to only a limited extent requires to be augmented by a dressing of about a ton to the acre. With the exceptional porosity of these soils, permitting rapid penetration of the lucerne-root, and their known capillarity, conditions favourable to lucerne are seen to exist in a special degree, and effective manuring by means of top-dressing is then made possible.

The experiment above referred to was commenced in the spring of 1911, but, owing to very unfavourable weather, difficulty of securing labour, absence of power and the necessary implements, it was not sown till December. The land was treated with a ton of lime and 300 lb. of inoculated soil to the acre. Marlborough seed was sown, at the rate of 15 lb. to the acre, and at the time this was sown 2 cwt. of basic slag was applied. Unfortunately the drill available was out of date, with the result that the sowing was practically broadcast, which unfortunately did not admit of proper after-cultivation. The seed germinated well, and gave promise of a good crop, but weeds quickly asserted themselves, rather to the detriment of the lucerne. Portion of the ground was then hand-weeded. The lucerne was cut twice in the autumn, both the cuttings being allowed to remain on the ground as a mulch. About three months from sowing the land was harrowed once, and a top-dressing of 2 cwt. of basic slag and 1 cwt. of potash to the acre was applied.

Since then the lucerne has more than held its own against the weeds, and this all over the plot. In October last there was a splendid succulent top growth of a rich dark-green colour, quite 18 in. high.

Owing to the healthy appearance of the crop, I was rather curious to observe how deeply the roots had penetrated the pumice soil. A root in the weeded portion was therefore dug out, when it was found that the ten months' root obtained was quite 4 ft. 6 in. in length. This does not represent the complete penetration, as, the root descending quite perpendicularly, and at the lower depth being very fine, some portion of it was unfortunately broken off. Such development, under the conditions pertaining, is remarkable. It doubtless accounted for the extremely healthy appearance of the plant, and certainly points to the successful establishment of lucerne on pumice country. A root was also dug up on the unweeded portion. This had only penetrated some 3 ft. in the pumice, but the plant had developed a great many surface roots. Each plant removed from the soil carried numerous bacterial nodules.

That lucerne can be grown on the pumice lands was again exemplified on another plot many miles distant, where the seed was sown broadcast on the first furrow, and under very ordinary field conditions. This particular experiment was generally a failure, yet quite a number of plants could be seen growing vigorously and presenting a healthy appearance. If not destroyed, the progress of these will be carefully noted.

Further experiments are being made this season on plots at considerable distances from one another. These are being hand-sown in lines, to admit of weeding. This process has been adopted as no implements are available in the isolated country being dealt with.

From the experience already gained, I would advise any one contemplating growing lucerne on pumice lands to thoroughly cultivate an acre and sow the seed in drills. Once a stand is secured, inoculated soil, an essential for such lands, can be procured from this to sow larger areas.



HIGH-TYPE SOUTHDOWN RAMS, BRED IN ENGLAND.

RUST-RESISTANT OAT.

THE picture on the opposite page illustrates a patch of the Ruakura rust-resistant oat, grown in the nursery at the Ruakura Farm of Instruction. The plot was grown merely to smother dock, seconds of the seed being employed in order to give the oat a severe test as to its capacity to withstand rust in the winter. It was planted broadcast on the 5th July, the horse cultivator being run through the plot twice. The photograph was taken on the 23rd October. At that date it would have required five weeks of fine weather to bring about the ripening process. The quality of the grain of this oat, by the way, is little better than Algerian, and in colour is similar to the Dun. While oats in other parts of the farm were affected with rust, this plot and a larger area of the Ruakura variety grown under ordinary field conditions are perfectly clean.

The young oat-plants in the foreground of the picture afford a striking illustration of the great variation occurring in one strain of Algerian oats. The variation has been determined by single-head selection, 132 heads being represented. It was by this method of single-head selection that the Ruakura rust-resistant oat was isolated in 1908 from the strain "Argentina."

This Ruakura selection is clearly rust-resistant under local conditions, but is at present regarded as providing the mere groundwork of an improved variety. With the object of testing its resistant power under varying conditions, five acres of it are being grown this season. The necessary seed for testing purposes will be thus available to farmers in different parts of the Dominion.

Californian Thistle Ensilage.—A southern farmer who has tried making Californian thistle into stack ensilage for the first time speaks most enthusiastically of the good results obtained. He found ensilage a good food all the year round for stock, especially dairy cows; and, further, though grass was in abundance, the stock preferred the ensilage. He gives it as his opinion that through feeding his cows on ensilage their milk-yield was increased considerably. Some farmers are of the opinion that the cost of making stack ensilage from Californian thistle is heavy. In a sense this is correct, but where the thistle is growing in profusion it is necessary to cut it, and the careful farmer has it carried away and burned. Half the expense of making ensilage lies in the cutting and carting, an operation that has to be performed in any case. It has been found that a square stack is the most economical, as there is not so much waste on the outside as in other shapes.

—*Fields and Experimental Farms Division.*

DEC. 16, 1912]

JOURNAL OF DEPARTMENT OF AGRICULTURE.

601



THE RUAKURA SELECTED RUST-PROOF OAT.

THE RABBIT PEST.

EFFECTIVE METHODS OF CONTROL.

J. W. DEEM.

THE rabbit pest in this country still remains a serious problem. One outstanding fact, however, which must be recognized if successful repression is to be secured is uniformity of action on the part of owners of affected areas. Many farmers are controlling the pest in a satisfactory manner, others are merely checking their march of progress, while a number—unfortunately large—are neglecting to take any measures either to stamp out or even control the vermin. In order that there may be no excuse on the part of owners in general, and particularly of those on areas on which the rabbit has but recently established itself, the most approved means of control are here outlined.

RABBIT-PROOF FENCING NECESSARY.

On country where rabbits are numerous a first and most important step is the erection of rabbit-proof netting fences on the boundaries and on as many subdivisions as circumstances and the nature of the country will permit.

HOW TO ENSURE EFFECTIVE POISONING.

The next step is to ensure a successful pollard poisoning. In this connection every care should be taken to ensure successful work, as it is by the aid of this poisoning that control of the pest is principally obtained. It is an admitted fact that one thorough poisoning is more valuable than a dozen patch poisonings. A suitable time must be chosen for the purpose. Fine weather is absolutely necessary for successful work. The autumn (February and March) will generally be found most suitable, though there are localities where the work has to be done either earlier or later. Before poisoning operations are started the rabbits should, for a short time, be left undisturbed, as when disturbed they often fail to take the poison. Under no circumstances must the men engaged in laying the poison be accompanied with dogs. The rabbits must be left alone as much as possible while the poison is being laid and for a week afterwards. Engage a sufficiently large staff to perform the work, so that it may be done in the

shortest possible time; this is important, as the more quickly the work is effected the better will be the results. If the property is netted, poison each division in a face, taking care to finish one division before another is started. If the property is not netted, select a natural boundary, such as a river, rough creek, or strip of bush; work from this, and aim as far as possible at natural boundaries. Neighbours should start simultaneously. The reasons for the above precautions are that rabbits after eating poison often cause alarm by squealing, and otherwise indicate trouble, with the result that those that have not taken the poison probably pass to adjacent land, to return later to the poisoned areas, with the result that the poisoning operations are not as effective as they should be.

The most satisfactory method of laying poison is to place one or two baits in a newly made scrape, or on a freshly turned sod, made either with a grubber or a small spade, taking care to place the poison baits in as clean a position as possible. In cultivated paddocks or small areas where sheep are grazed thickly there is some danger of the stock becoming poisoned. To prevent this the following method is adopted: With a small grubber, made for the purpose, cut a clean hole in the ground, say 6 in. long, 2 in. wide, and from 2 in. to 3 in. deep, and place the bait in the bottom of this. The sheep should be then quite safe. The alternative is to remove for a week the sheep from the paddock to be poisoned, after which the poison may be collected and the sheep be returned. For paddocks and small areas it is only necessary to lay poison on the usual feeding-grounds, always taking care to place it some distance—say, half a chain—away from burrows. On larger properties, and where rabbits are more or less distributed over the whole area, the usual practice is for poisoners to travel in lines from 1 to 2 chains apart, putting a bait down every 4 to 6 yards, according to the number of rabbits on the land. Here again common-sense is required. Frequently gangs of men are to be seen going through the country on the rule-of-thumb system, clambering through scrub, bogs, fern, &c., laying baits methodically enough in rows $1\frac{1}{2}$ chains apart, and baits every 4 yards. The aim in laying poison is to place it on the rabbits' feeding-grounds. These are the more open patches, where the grass is shorter and more appetizing. A pound of poison laid on these patches is worth ten among thick scrub and fern; consequently there are places where the lines may be 3 chains apart, or, on the other hand, they may be only half a chain. The same thing applies to the baits.

Pollard poisoning will not remain effective or attractive after much rain; not that the ingredients deteriorate so much, but that they become soft and dirty, and are therefore not appetizing. With two fine nights after laying the poison there should be satisfactory results.

The bulk of the poison is eaten the first night, but when heavy rain is experienced during the first forty-eight hours after laying it is advisable to repoisson the ground at once. On light stony country, where scrapes cannot be made to advantage, or where the wind has a tendency to quickly obliterate them, poison should be laid on clean, bare or grassy patches; under this system the baits should be laid at more frequent intervals.

Pollard poison should be well made, and the phosphorus, sugar, and pollard should be of good quality and clean. Cleanliness should also be observed in the handling and laying, and under no circumstances should dirty or sour poison be laid. The following are two recipes for making phosphorized pollard:—

No. 1.—Boil 3 quarts of water and $4\frac{1}{2}$ lb. brown sugar in a clean oil-drum or kerosene-tin. When the liquor is boiling take it off the fire and put in 2 sticks of phosphorus (about 4 oz.). After allowing a minute or so for the phosphorus to melt, boil the whole again. Then lift it off the fire, and immediately begin stirring in pollard. Stir hard, as this is the time to get the phosphorus well distributed. Continue adding pollard until the mass becomes sufficiently stiff for kneading.

No. 2.—Mix, in a pickle-bottle or a tin with a tight-fitting lid, 1 tablespoonful of bisulphide of carbon and $1\frac{1}{2}$ sticks of phosphorus with $\frac{1}{2}$ pint of cold water. Allow this to stand till the phosphorus is thoroughly dissolved. In $3\frac{1}{2}$ pints of hot water dissolve 3 lb. of sugar. Pour both the above liquors into a clean vessel and stir well; then add pollard until the dough becomes stiff enough for kneading.

In either recipe, if the weather is extremely dry, it is better to use one-third less sugar, and substitute an equal weight of treacle. This will prevent undue hardening.

Have a clean board and roller, and keep them well dusted with dry pollard. Take about two handfuls of the dough out of the pot with a flat stick, throw dry pollard on it to stop any sparking, knead it, and roll it out to $\frac{1}{4}$ in. thick. Cut it into $\frac{1}{4}$ in. squares, and throw the ragged edges back into the pot. Gather up the squares with the dry pollard and place them in a box with more pollard.

POISONING MUST BE FOLLOWED UP.

Having completed a successful poisoning, and having succeeded in reducing the rabbit to a minimum, the work of suppression must not be relaxed, as every rabbit remaining on a property means hundreds next year if left to breed, and all the worry and expense of destruction over again are thereby involved. On all agricultural lands and on the

better class of sheep country one of the following systems should be adopted: As soon as possible after the country has been poisoned a fortnight men should go systematically over the property and carefully block up all burrows. The same men or, better still, another gang should follow over the same country two days after the blocking-up has been done. This latter gang should be provided with a few quiet-working rabbit-dogs to "hole" any rabbits that may be in the grass or scrub. This gang should deal with all live burrows — that is, all burrows that have been opened within the last two days or since they were blocked by the first gang — and if the poisoning has been successful these should not be more than 5 per cent. These burrows should be treated as follows: If they are in fairly retentive ground and are suitable for bisulphide, they should be treated by this means. There are two methods. The bisulphide may be pumped in by means of a fumigator, or a little of the liquid may be placed on a piece of old sacking or similar material and placed in the burrow; having done this, throw in a lighted match, when it will explode; care should be taken to at once block the burrow, so as to confine the fumes. The former is preferable, as there is a certain amount of danger in the igniting of the bisulphide. One or two pieces of sacking well saturated has been found effective without ignition — the fumes do the work. If the burrows are not too deep they may be dug out and the rabbits destroyed.

THE RIGHT WAY TO SET TRAPS.

Where the burrows are in loose sandy or shingly land unsuitable for bisulphide, and of such a deep and rambling nature as to make the cost of digging out prohibitive, ordinary rabbit-traps should be placed in the mouth of each live burrow. The method of working these is as follows: The trap is secured to the ground by means of a peg; it is then set and placed fair in the mouth of the burrow, with the jaws inward and just far enough out to allow the spring to clear the mouth of the burrow. No earth or anything else is placed on the trap, but the mouth of the burrow is darkened by means of a sod or stone in such a manner that, while not interfering with the trap, it will make the interior of the burrow quite dark. After a time the confined rabbit will make its way to the mouth of the burrow, and in escaping it is almost certain to become trapped. Traps should be kept at these burrows for at least four days. They may be examined morning and evening for the first few days, after that once a day will be sufficient. At the end of four days the traps can be removed and the burrow again blocked up. Throw as far as possible into the burrow three or four baits of pollard poison; if the rabbits are still in the burrow they may eat the poison. It will be necessary to go over this country

again in, say, a fortnight, to deal with any burrows that might have been missed or opened up by a rabbit from outside.

THINGS TO DO AND NOT TO DO.

Erect wire netting at the earliest possible opportunity.

Cut down cover, and, above all, never lose a chance to destroy a burrow—rabbits cannot exist long if their homes are destroyed.

Where rabbits are at all numerous, do not adopt other means until poison has been tried and failed.

Never allow a big pack of rabbit-dogs on the place; they only disturb sheep and scatter the rabbits. Small packs of dogs are only permissible on open country, where rabbits are thinly scattered and the burrows are shallow and are not numerous.

Do not allow a rabbiter to carry a gun except in very rough places; insist on his carrying a spade and digging out all burrows—this will be cheaper and a great deal more effective.

Do not employ a rabbiter who states it is easier to shoot the rabbits than to dig out the burrows; he will enjoy the sporting life, but he will not clear a property of the pest.

Do not lay pollard poison in wet weather.

To poison high wet country during winter use phosphorized oats, which will stand the wet weather better and give more satisfactory results.

Do not leave poisoning till the winter—by doing the work earlier wages will be saved.

Once the rabbits are reduced do not wait till the Inspector comes along and says they are increasing and want attention—keep a sharp look-out yourself.

Do not allow the men laying poison to skin rabbits as they go along—their hands become dirty and contaminate the poison.

If rabbits are numerous and it is wished to save the skins, employ other men to do the work.

Once having started poisoning go straight ahead, and do not allow a break, except for accident or bad weather.

State Grants to Live-stock Shows in Uruguay.—The sum of £10,625 has been allotted, in the Uruguay Budget for 1912, for grants to live-stock shows and fairs. Subsidies will be granted to associations that promote such shows, but not to private persons. Special prizes will be given in respect of (a) the breeding of horses, cattle, sheep, and pigs; (b) dairy-produce; and (c) those farms which have the greatest extent of seed-leas.

THE CULTIVATION OF THE VINE UNDER GLASS.

(Continued.)

S. F. ANDERSON.

TRAINING AND PRUNING.

STARTING with the young plant: It was stated in the October number of the *Journal* that it should be left to itself the first season, cultivation being all that is required. At the end of the first season's growth, and one year from planting, it should be cut back to two good buds made that season, and it would then present an appearance something similar to Fig. 2 (in the previous article). Two buds are kept, but only the growth from one is required, the second being reserved in case of accident. The object now is to get a single rod or shoot, as straight as possible, from that bud, and as the growing season advances this should present an appearance something similar to Fig. 4. It will be found that side shoots will push out from that stem or rod, but these must not be allowed to outgrow the main one, marked A, A, A. To prevent this the growing tips of the side shoots are pinched at B, B, B. It is very necessary for the thorough establishment and the building-up of a strong vine that it be allowed as much foliage as possible consistent with the training of the future rod: hence only the tips of the side shoots are pinched. In no case must the point of the main shoot marked C be stopped. At the end of the second season from being planted it should have grown a fairly strong rod from 8 ft. to 10 ft. or more in length. In the winter prune off the side shoots and tendrils. It should then have an appearance as in Fig. 7. It can now be brought into the house. It may be that it is strong enough to take to the apex of the roof at once; if not, it can be cut back to A (Fig. 12). If it should happen through accident or other cause that the rod is weakly and short-jointed, as shown in Fig. 6, then cut back to B in Fig. 12. Provided the vine has been grown on a well-made-up border and received good cultivation and training, a strong rod may be confidently looked for.

After the rod is brought into the house the growth is very strong, and will require judicious treatment, first in the extension of the rod, and secondly control of its fruit-bearing and foliage. From 5 lb. to 10 lb. of fruit is all that a vine of this age should be allowed to



Fig. 4.

One year's growth after being cut back to *. In this case the second, or spare, bud is rubbed off.

bear. The buds will now send out very strong shoots. These can be allowed all the latitude possible for this season, just pinching back where too much overlapping occurs. At the top of the house very little restraint is necessary. The treatment of the few laterals allowed to carry fruit will be the same as that for the fourth year (which see later). To permit the vine at this season (the third from planting) to bear all the fruit it will make the effort to do, and to deprive it of the foliage to the extent that is necessary later on, would at this stage prevent in a great measure that building-up of the plant mentioned above which is so necessary to its future vigour. It is very hard to get beginners in vine-growing under glass to control the desire to leave too heavy a crop on young vines. It is, however, very necessary to extend by degrees the fruit-bearing capacity of the vine under glass until there is that balance of root-power with the top. If all has gone well and the rods completed where required the house should now be provided with strong long-jointed rods from bottom to top of rafters, straight and regular in thickness and even in length of joints.

We have now come to the fourth winter since the planting, and should have a house provided with strong vines capable of bearing a moderate crop in the ensuing season—that is, a house of the size given with a $10\frac{1}{2}$ ft. rafter. In the case of a large vine-house, where the rafters are 16 ft. or 20 ft. long, it may take two years to obtain strong equal-sized rods to the top of the house.

After the fruit is all off, the house should be kept open day and night, to permit air and cold to thoroughly ripen the wood. When the leaves have all fallen—

this will be about June—the pruning may be commenced. This is done with secateurs. The secateurs should be in good order, so that the cuts may be quickly and cleanly made. Fig. 5 shows portion of a rod as it appears at this age of the vine—viz., entering upon its fourth growing season. It will be seen on Fig. 5 that at the base of the shoots marked A, A, A, A, there are buds, and a line is drawn showing where the cut is to be made. The vines being now ready for bearing their first crop of fruit, the all-important treatment of the fruit-bearing shoots (or laterals, as they are termed) claims attention. When spring arrives each bud on the rod will send out a shoot, and, as it lengthens, the fruit appears at about the second or third joint (see Fig. 10, A and B), but this varies in different vines. With Black Hamburg bunches will occur usually at the fifth joint, with Gros Colman at the second or third, and with Golden Queen at the fourth joint from the rod. The joints or nodes also vary in length. In the young rod there is generally only one shoot from each bud, but as the vines get older more than one may occur; but of that I will treat later.

The growth made by vines at this stage is very strong. The shoots should be allowed to grow until the young fruit is sufficiently developed to enable the grower to decide on the best bunch to keep, as there is generally more than one. The bunch nearest the rod is nearly always the one retained, but that is not invariably the case. The length of the shoot may be seven to ten joints or leaves from the rod before the selection can be decided on. When that has been

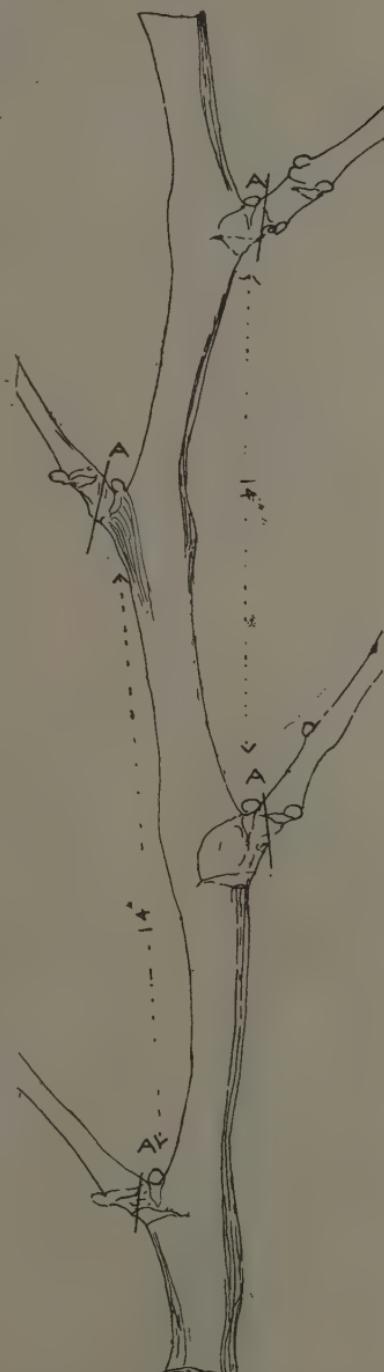


Fig. 5.
Section of rod ready for first pruning.
A, where cuts are to be made.

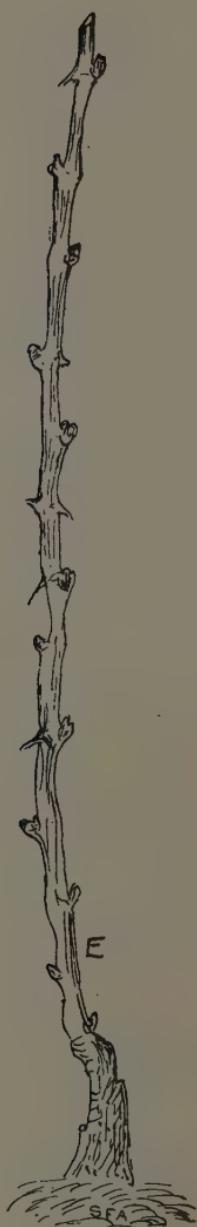


Fig. 6.

A rod with short, irregular joints like this should be cut back to E.

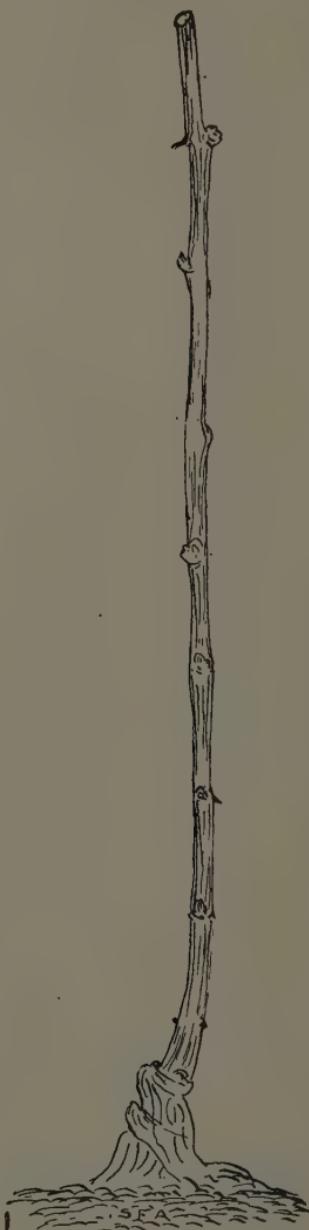


Fig. 7.

A good rod that may be retained for bringing into the house.

done the shoot bearing the fruit may be pinched at the third or fourth leaf beyond where the fruit is showing, but never less than two leaves beyond the fruit. Soon after the first stopping further growth will appear. When this second growth has produced three to four more leaves it should be pinched again, the first stopping. It will second place pinched, must be left. In all stopping during the growing season left a leaf or two of the

As this first, second, shoots proceeds it will be growth is weakened, and At the same time sub- any of the joints, as they do, do not break be just nipped back, leav- As the operation of stop- noticed that the leaves larger, in fact, than they conditions. In no case removed. With regard to rods at the top, these may the same as that advised ing them over the top and down the opposite side, stopping them in the same way to prevent overcrowding and shading.

After gathering the crop and before the leaves fall there is considerable growth. This should be encouraged. It is too often the practice with growers, after the fruit has been gathered, to cut back the laterals to three or four leaves, with the object of ripening the buds and letting in the light. This is against the rules of plant-physiology. "From the time leaves are fully grown until they fall they are yielding up to the plant the starch and protoplasmic substances, together with most important mineral matters, such as phosphoric acid and potash, which are transferred to the permanent parts of the plant before the leaves fall." (J. D. Hooker.) When all the leaves have fallen—this will be about June—the pruning may be commenced. It is shown in Fig. 8 how the cut should be made in a vine of the second season's growth. Differing from the pruning of a new rod, where there is only one bud to cut back to, we may now have more than one, and as the rods grow older the pruning often causes shoots to start in the spring from the thickened portion of the base of the old shoot. These are produced by adventitious



Fig. 8.

A, properly pruned spur. B, wrongly pruned. Vine of the second season's growth.

leaving two leaves beyond again start from the when another two leaves ping or pinching of shoots there should always be last-made growth.

and third stopping of noticed that the effort at the joints become shorter. laterals may start from shown in Fig. 11, B. When them out. They should ing two or more leaves. ping proceeds it will be attain their full size— would be under natural should any of these be the growth made by the be allowed to grow about for the side shoots, training

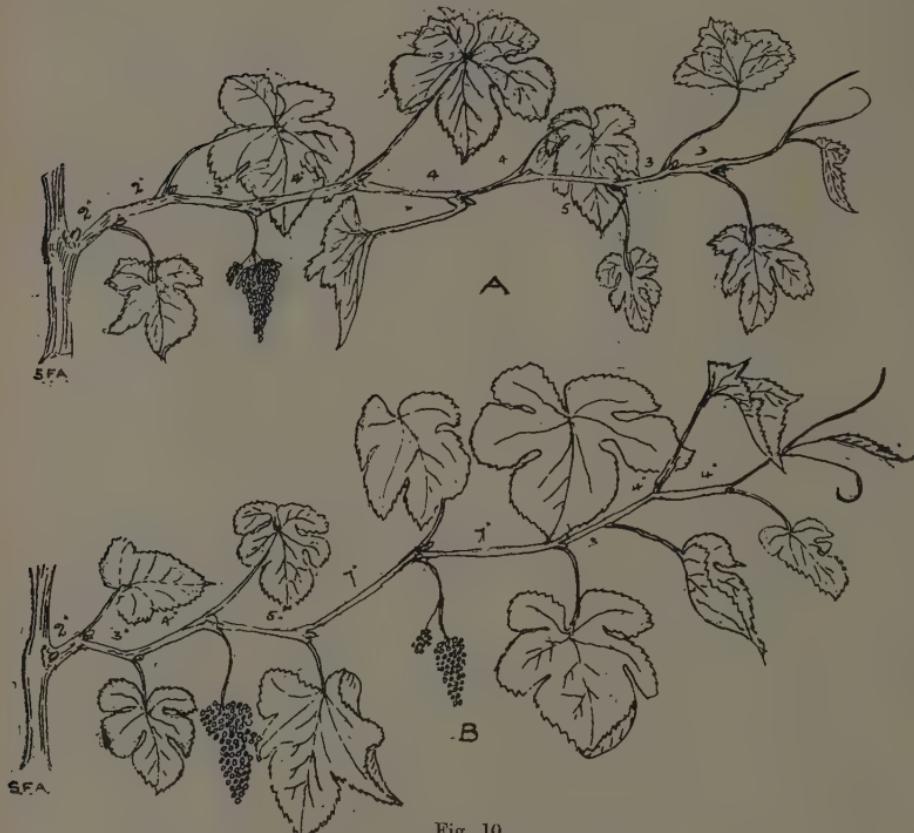


Fig. 10.

Fruit-bearing laterals. The figures are measurements of the joints.

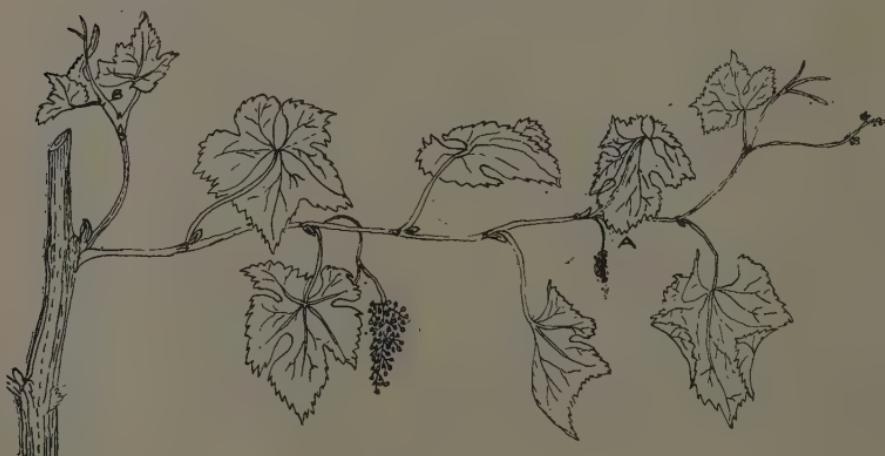


Fig. 11.

Portion of rod with fruit-bearing lateral. A, where the first stopping should be done; B, a sub-lateral or secondary shoot, which should be pinched above the first leaf.

buds. It is safer in all cases, however, to make sure at the time of pruning that the cut is made above a healthy prominent bud.

The rods should be lightly tied up to the wires until the house has been cleared of prunings and dead leaves. The pruning in subsequent years will be on much the same lines. The winter treatment of the rods, &c., will be dealt with in later issues. Vines should be tied with some material that will not harbour insects or their eggs. The binder-twine is one of the worst things to use on this account. Lead wire is one of the best; it is clean, cheap, pliable, and strong.

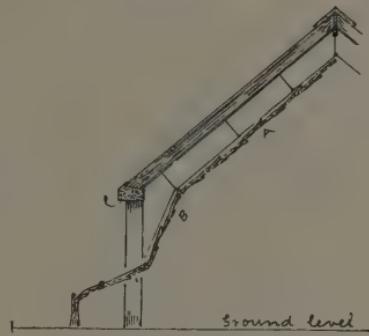


Fig. 12.

The vine brought through side of house and fastened to the wire.

(To be continued.)



PECULIAR DEVELOPMENT.

IN the two trees of the peach variety Sellar's Cling growing in the orchard of the Ruakura Farm of Instruction an interesting development has taken place. The number of ovaries in the blossoms varied from one to four, each ovary having a fully developed style and stigma. Now that the fruit has set there are seen to be two to four distinct peaches joined at the base, and all produced from the one flower. This peculiar formation is common to both trees.

VETCHES AND BARLEY.

MOUMAHAKI EXPERIENCE.

THE value of this mixture for providing a large amount of feeding for milking-stock at periods of the year when pastures must be supplemented has been well demonstrated at Moumahaki Experimental Farm. On the 14th March of this year a 5-acre field of rye stubble was disced and sown with vetches and barley, the seeding being at the rate of $2\frac{1}{2}$ bushels per acre and the manuring 1 cwt. of basic slag per acre. Twenty fattening bullocks—for topping off after being brought to good condition on swedes—were turned on to the dense growth, 18 in. in height, on the 25th June, and on the 8th July they were in prime marketing form. The twenty bullocks had left the crop eaten down hard. On the 17th of the same month twenty store bullocks were turned in, and the bite of green stuff remaining was supplemented by mangels carted out to the field. By the 13th August, when they were taken out, the cattle were in fat and forward condition, and the continued bite of vetches and barley materially assisted in the fattening process. By the 28th October the crop made a splendid second growth, again a dense 3 ft. development, when the cutting of a portion of it for forage for milking-stock and draught horses was commenced. This feeding-out was necessary in order to conserve the pastures, owing to the heavy stocking of the farm. The balance of the field is being converted into silage, a large amount of fodder being now available after having provided a great wealth of feeding-material in the winter months. The expenditure in producing this crop was approximately £1 8s. per acre—discing 2s., seeding 2s., rolling 2s., manure 4s., seed 18s.—and at this cost it is certainly one of the most economical crops that can be grown.

A NOTE ON BUSH SICKNESS.

In the issue of the *Journal* for November two illustrations appeared in connection with my article on "Certain Nutritive Disorders of Live-stock." The titles to these should have read that the cattle had been depastured on top-dressed paddocks in bush-sick country for one year and six months, and the sheep for one year and nine months. It is my desire that all records in connection with this and other experiments should be scrupulously exact, hence the correction.—*C. J. Reakes.*

DAMAGE TO SHEEP-SKINS THROUGH CARELESS SHEARING.

THE accompanying photograph illustrates the effect of the damage caused to sheep-skins by careless shearing. The marks shown on the skin are healed-up lesions caused by the shears, and this over several years, the effect on old skins being almost as great as those made during the last shearing. The skin was picked out in the ordinary way of business by the Wellington Meat Export Company, and is stated to be by no means the worst obtainable. In some skins the shear-marks are from 6 in. to 8 in. long. Apart from the aspect of the cruelty of the maltreatment, pelts disfigured in this way have to be placed in a lower grade than would otherwise be the case, and at a loss of about 5s. per dozen. It will therefore be seen that more than double the cost of shearing sheep may be lost through careless work in the shearing process.



THE LAMBING AT MOUMAHAKI.

THE season's lambing at Moumahaki Experimental Farm has been very successful. The whole flock (24 Border Leicester, 40 Border Leicester-Ryeland, 40 Lincoln-Ryeland, 40 Romney-Ryeland, and 220 crossbred ewes—364 in all) gave an average lambing of 145 per cent., the lambing commencing during the first week in August. The first draft of lambs off the mother were six weeks old when disposed of, and were the first lambs of the season on the Wanganui market. These realized 14s. 9d. The average live weight was 44 lb. The ewes were wintered on ordinary pasture, and at lambing-time received an unlimited supply of mangels, carted out to them. When the mangels were finished (the lambs at the time being about a month old) the ewes and lambs were turned on to rape, silver-beet, kale, and chou moellier, and were fed in troughs at the same time with a limited amount of crushed barley and peas mixed with chaff, at the rate of about 1 lb. weight a day per head, $\frac{1}{4}$ lb. of barley and peas, and $\frac{3}{4}$ lb. of chaff. This method of feeding has been amply justified. After a fortnight on it (the lambs being then six weeks old) the average weight was 44 lb.; three weeks later the average weight was 63 lb. The lambs marketed at these dates were by Dorset Horn and Southdown rams out of ordinary crossbred ewes, the numbers of the two crosses being about equal. When the lambs were ten weeks old the grain mixture was withdrawn, and the ewes and lambs were turned on to ordinary pasture to allow the green crops to recover. At the time this was done seventy lambs had gone to market in a prime condition. The accompanying photograph, taken on the 19th November, shows the green crops being fed off the second time. Preference was shown by the ewes and lambs to rape, and then the silver-beet, with buda kale next, then chou moellier, and thousand-headed kale last.



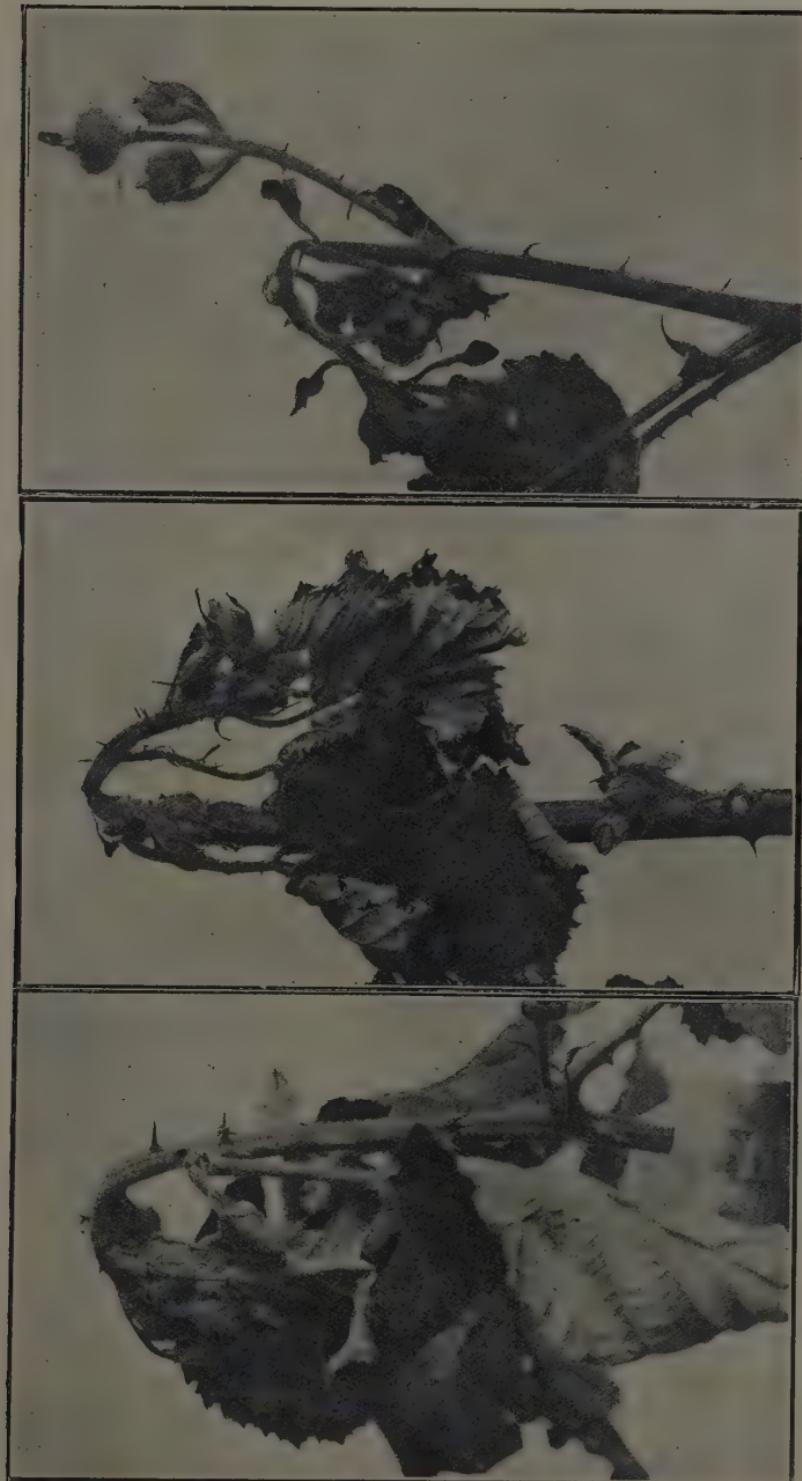


ILLUSTRATION OF WORK OF THE BLACKBERRY-BUD MOTH.
Blackberry, showing effects of attack by Blackberry-bud Moth (*Carposina adrepella*). Hole in stem of No. 1 picture represents the point of entrance of the larva.

M I L K - S U G A R.

J. PEDERSEN.

DURING my visit to Europe for the special purpose of gathering information relative to the casein industry I was able to collect some particulars in regard to the preparation of milk-sugar and its value as a commercial product.

Sugar of milk, or "lactose," as it is sometimes called, is mainly used in the preparation of foods for infants, for medicinal purposes, and in the making of pure cultures of lactic acid, &c. It may be mentioned that the making of this product was first developed as an industry in Switzerland, and for some time an export trade was carried on between that country and the United States of America. Of recent years, however, this trade has ceased, owing to the establishment of milk-sugar factories in the United States. Inquiries made go to show that the production of the article in Europe will in the future be a diminishing quantity, the reason assigned for this being the continually increasing demand for whole milk and skim-milk for consumption in the large cities, and the fact that the prices paid for milk for these purposes are much above those obtainable for it at dairy factories. It is interesting to note in this connection that supplies of milk for city consumption are now being drawn from Denmark to Berlin, a distance of over four hundred miles.

Although the present market price for milk-sugar is comparatively high and is not likely to decrease, it must not be assumed that there is an unlimited demand for the product. While it might pay a few of the larger cheese-factories to take up the manufacture of it in New Zealand, it cannot, owing to the somewhat restricted demand, be at present considered a good business proposition except for two or three of our largest dairy companies. It has also to be remembered that Great Britain and France are amongst the few countries that have not placed a highly protective Customs tariff on the importation of milk-sugar (see list in another part of this report).

METHODS OF PREPARING MILK-SUGAR.

When the making of sugar of milk was first commenced in Switzerland the method of obtaining the sugar from the milk was very primitive in character. The whey or water of milk was merely

evaporated in shallow pans placed over a naked fire, often in the open air. The liquid was boiled until it assumed the consistency of syrup, which took from sixteen to twenty-four hours, according to the percentage of sugar in it, after which it was cooled. This cooling was also done in shallow pans, and occupied about forty-eight hours before the required temperature was reached. The extracted sugar-sand, as it is called at this stage, left in the bottom of the pans was then broken up and rinsed with plenty of cold water, in order to purify the sugar crystals, care being taken to conserve the rinsing-water, which contained a certain amount of sugar and was therefore of value for feeding purposes. The dried coarse sugar was then sold to the sugar-refinery. By this primitive method only 2 to $2\frac{1}{2}$ per cent. of raw sugar or 1.2 to 1.5 per cent. of the refined article was recovered from the whey.

The system of to-day is, of course, entirely different, and the manufacture of milk-sugar is now a highly specialized industry. From investigations which the writer was able to make in Germany and Sweden, the following is a description of the system now adopted in those countries for the recovery of the sugar from milk. For the sake of clearness, the process may be described in two distinctive parts: First, the extraction of the raw sugar, which means the crystallization of the sugar in the whey; and, second, the refining of the product.

Extraction of the Raw Sugar.—As the quantity of sugar recoverable from the whey decreases in proportion to the acidity of the liquid, it is essential to commence treating the whey at as early a stage as possible, or when the whey is in its sweetest condition.

The liquid is first treated with milk of lime, which has the effect of neutralizing the acidity in the whey, while it also acts on the albumen and prevents fermentation. From 50 to 100 grams of lime are used to each 20 gallons of whey, according to the degree of acidity in the liquid. The whey is then pumped into a large vacuum pan, where the process of condensation is begun. This condensation under a vacuum permits the liquid to boil at a low temperature and prevents any burning on, as well as any material change in the whey solids. The whey is condensed down about 60 per cent., or until it shows, by the Baumé test, a degree of 30 to 32. If condensation is carried on beyond this degree the whey syrup becomes very smeary or greasy, which shows on the glass of the vacuum pan. This must be avoided, as the yield is lessened and the quality affected when it is allowed to take place. The thick condensed whey syrup is then run into shallow vats for cooling. It is stirred occasionally during the first ten hours, and in twenty-four hours' time the temperature should be about 68° Fahr. At this stage it is partly solidified and has the appearance

of a yellow coarse-grained pulp with an oily layer on top. To separate the crystals the sticky fluid is mixed with cold water and placed on the separator. The separator consists of fast-revolving drums lined with a filter-cloth or metal sieve. Its speed is far less than that of the ordinary milk-separator. By the centrifugal force leaving the lactose crystal on the washer-screen the syrup is forced through the filter, the washing being done while the separator is revolving. In this way two-thirds of the milk-sugar are extracted. The syrup which has been forced out of the separator contains the rest of the milk-sugar (usually about one-third) besides the albumen and other impurities. To extract the albumen, the syrup is heated in a vat to boiling-point. When this is done the albumen will float on the top, when it can be skimmed off. This having been done, the syrup is again run into the vacuum pan, and this time is condensed to 35° Baumé. It is then cooled down for crystallization, in about forty-eight hours, and is of a greasy brown colour. At this stage it is again separated and washed with plenty of cold water, from 0.3 to 0.7 per cent. of the milk-sugar being extracted. The wash-water still contains a small percentage of sugar, but this it is not possible to extract. In practical work about 4 per cent. of raw milk-sugar is extracted from the whey. This raw milk-sugar still contains some albumen, ash, and traces of fat, and has yet to be refined.

Refining of Milk-sugar.—The raw sugar of milk is dissolved in water at a temperature of 112° Fahr., thus forming a syrup containing 24 to 27 per cent. of milk-sugar, equal to 15° Baumé. The solution is treated with 1 per cent. of pulverized charcoal and 0.2 per cent. of acetic acid, and is then heated to boiling-point. When nearly boiling some makers believe in adding some sulphate of magnesia and keep the liquid boiling for a few minutes. This will bring up the temperature to about 220° Fahr., and the liquid will foam a good deal. It is then pumped into a vat, and from there, while still hot, it gravitates to the filter-press.

The filter-press consists of a number of frames covered with a filter-cloth. The frames slide on two horizontal iron bars, and can be tightened or loosened in order to compress the liquid. Every second frame is provided with a tap, while the intervening frames, by means of the filter-cloths, retain the dry matter and other impurities in the liquid. A hopper collects the filtered liquid, while the residue left on the filter-cloths is generally used as a fertilizer. The filtered liquid left in the hopper is a clear, pure milk-sugar solution. This clear syrup is brought back to the vacuum pan and condensed to 35° Baumé.

The condensed clear fluid is then run into the crystallizing-vat, is cooled down, and, through separation and washing, is finally cleaned

from the syrup. The white sugar mass left on the separator-screen has yet to be dried. The syrup which comes out of the separator is again condensed, crystallized, washed, and separated, to extract the remainder of the sugar. According to Zirn, 3·4 per cent. of refined milk-sugar is the maximum quantity obtainable from whey.

The refined article must be dried as soon as possible. The drying can be done in a rotary slanting cylinder, through which hot air is continually forced, or it can be done in a vacuum oven, which is now considered the best system. The milk-sugar is placed on shelves in a thin layer. On account of the vacuum the moisture evaporates very quickly without much heating.

After it has been cooled down the dried sugar is ground fine in a pebble-mill. It will then be a fine powder of pure-white colour. This is packed in cases containing from 100 lb. to 200 lb. The total amount of finished milk-sugar extracted from whey is 2·5 to 2·6 per cent.

The Swedish System.—In the large milk-sugar factory in Huledal, Sweden, the following method of extracting milk-sugar is followed:—
Obtaining the raw sugar: The whey is scalded in the whey-tank as soon as possible, by which process most of the whey albumen and fat is collected on top. These are then skimmed off. The whey passes through a filter to another tank. The boiling, skimming, and filtration decrease the volume of the whey about 15 per cent. The liquid is condensed in an open cheese-pan to one-third of its volume. From there it passes to the vacuum pan and is condensed at a temperature of 143° Fahr. to a suitable consistency. The thick condensed whey syrup is then run into large enamelled pans, which are provided with slow rotary agitators. By this means the syrup is cooled to 76° Fahr. in forty-eight hours. During this time most of the milk-sugar will become crystallized. The stirring is done to prevent large hard lumps being formed. The crystallized material is washed and put through the separator. This extracts the syrup and molasses, while the raw milk-sugar is left on the separator-screen. As the separated syrup still contains some milk-sugar, it is again pumped into the vacuum pan, condensed, and, with plenty of cold water, is put through the separator again. The sugar obtained on this occasion is not so pure as, and is darker in colour than, the first lot crystallized. It is therefore necessary to refine it twice.

The raw sugar taken from the separator is dissolved in water at a temperature of 112° Fahr., forming a syrup with a specific gravity of about 1·14. To this solution is added 1 per cent. of charcoal and 0·2 per cent. of acetic acid. When the solution is near boiling-point some sulphate of magnesia is added. After this addition it is boiled for

five minutes, and the froth skimmed off with a hair sieve. The dark fluid, which through the action of the charcoal has turned into a grey colour, is pumped into a tank, and from there while still hot through the filter, which makes it quite clear. The filtered fluid is pumped into the vacuum pan, some alum and charcoal added, and it is then condensed to a suitable consistency. After this it is filtered and run into a vat for crystallization. The next day it is separated, and the milk-sugar extracted from the syrup. The sugar is washed with plenty of cold water, which makes it as white as snow. The refined milk-sugar is dried in the usual way. By this method about 4·2 per cent. of raw sugar or 2 to 2·5 per cent. of refined sugar can be extracted from the whey. Considering that the whey contains about 4·6 per cent. of sugar, there is 2·1 per cent. of sugar left in the by-products during the process of manufacture.

The cost of production at the Swedish factory has been as follows : Extraction of raw sugar, per 100 kilo of whey, 6d. ; refining the raw sugar, per 100 kilo of whey, 5d. ; or total cost of producing the finished product, £20 per ton. This cost of manufacture is based on a daily supply of whey of from 2,500 to 3,000 gallons. The whey is valued at about $\frac{1}{2}$ d. per gallon. On account of the much larger quantity of whey which can be handled in one place in New Zealand, the cost of manufacture here should not be much above this estimate. For example,—

8,800 gallons of whey would produce 1 ton of milk-	£	s.	d.
sugar, worth, say	45	0	0
Cost of manufacture	20	0	0
	25	0	0
Value of whey, say $\frac{1}{2}$ d. per gallon ..	18	6	0
Net profit per day	£6	14	0

The value of milk-sugar has been put down at £45 per ton, but this is rather low, as the average price would be above £50 per ton. The by-products from the manufacture of milk-sugar have not been taken into consideration.

By-products from Milk-sugar Manufacture.—The albumen is the only by-product from the manufacture of sugar of milk which is of any material value, the other by-products being used as fertilizers only. From 100 kilo of whey about 5 kilo of molasses albumen is obtained. Mixed with potatoes or turnips this is excellent food for fattening pigs. It is often used in making whey cheese (Ziegerkase). When fresh it is

used or human consumption, or mixed with flour for bread, or in making several albuminous preparations.

Manufacturers of Plants for making Sugar of Milk.—Following are the names of some of the best-known German manufacturers of vacuum pans and vacuum drying plants: F. Heckmann, Berlin, S.O.; Jul. Pintsch, Limited, Berlin, O. 117; Braunschweigische Maschinenfabrik, in Braunschweig; F. Hallstrom, Nienburg, A.S. The following are makers of the separators required: Gebruder Heine, Viersen, Rheinland; Leopold Ziegler, Berlin, N. 65. Filter-presses can be procured from A. L. G. Dehne, Halle a/Saale; Badische Maschinenfabrik, Durlach Baden.

Cost of Plant for the making of Milk-sugar.—The machinery to handle about 4,000 gallons a day would cost about £2,000. This does not include the boiler or engine, but merely the vacuum pan, separators, filters, drying-oven, mill, &c. A proper estimation for a given quantity of whey can be had from any of the above-mentioned makers.

Milk-sugar Factories in Europe.—The following are the addresses of some of the factories manufacturing milk-sugar in Sweden, Germany, and Italy: *Germany*—C. Balle, Berlin; Otto Evers, Milchzuckerfabrik, Germania, Molln, in L.; Radlitzer Malkerei Smichow-Prag, in Bohmen; Joh. A. Wulffing, Gronau, in Hannover; Dr. Heilmann Chem fabrik, in Gustrow in Mecklbg. *Sweden*.—Malkesukker fabrik, in Huledal, in Sweden. *Italy*.—Polenghi Brothers, in Lombarda in Lodi; Latteria Soresinense, in Soresina Cremona; Erba Limited, in Mailand.

Duty on Milk-sugar in some Countries.—The following shows the duty imposed by some countries on the importation of milk-sugar: Germany, £40 per ton; Spain, £160 per ton; Portugal, £24 per ton; Russia, £12 per ton; Italy, £40 per ton; Japan, £15 per ton; Brazil, £106 per ton; Denmark, £22 per ton; Sweden, £13 per ton; Switzerland, £4 per ton; Australia, £10 per ton; Canada, 20 per cent. *ad valorem*; United States, 2½d. per pound.

Price of Milk-sugar.—The following shows the prices ruling for sugar of milk during the past ten years: 1900, £45 per ton; 1901, £44 per ton; 1902, £40 per ton; 1903, £40 per ton; 1904, £52 per ton; 1905, £58 per ton; 1906, £61 per ton; 1907, £60 per ton; 1908, £49 per ton; 1909, £46 per ton; 1910, £43 per ton.

MILK-SUGAR AND CASEIN FROM BUTTERMILK.

During my visit to Copenhagen I called on Mr. Eilersen, who claims to have invented a cheap system of extracting casein and milk-sugar from buttermilk. The system has been described and published in the *New Zealand Dairymen*.

According to Mr. Eilersen the extraction of the casein and milk-sugar from a daily supply of buttermilk of 5,000 gallons would leave a net profit of £47. His estimate is made up as follows:—

5,000 gallons buttermilk would yield—	£	s.	d.
1,500 lb. casein, at 4d. per pound ..	..	25	0 0
1,000 pounds milk-sugar, at 9d. per pound ..	..	37	0 0
	£	s.	d.
Less—Expense of making the casein ..	..	6	0 0
Expense of making the sugar ..	..	9	0 0
	£	s.	d.
Net profit per day .. .. ..	..	..	£47 0 0

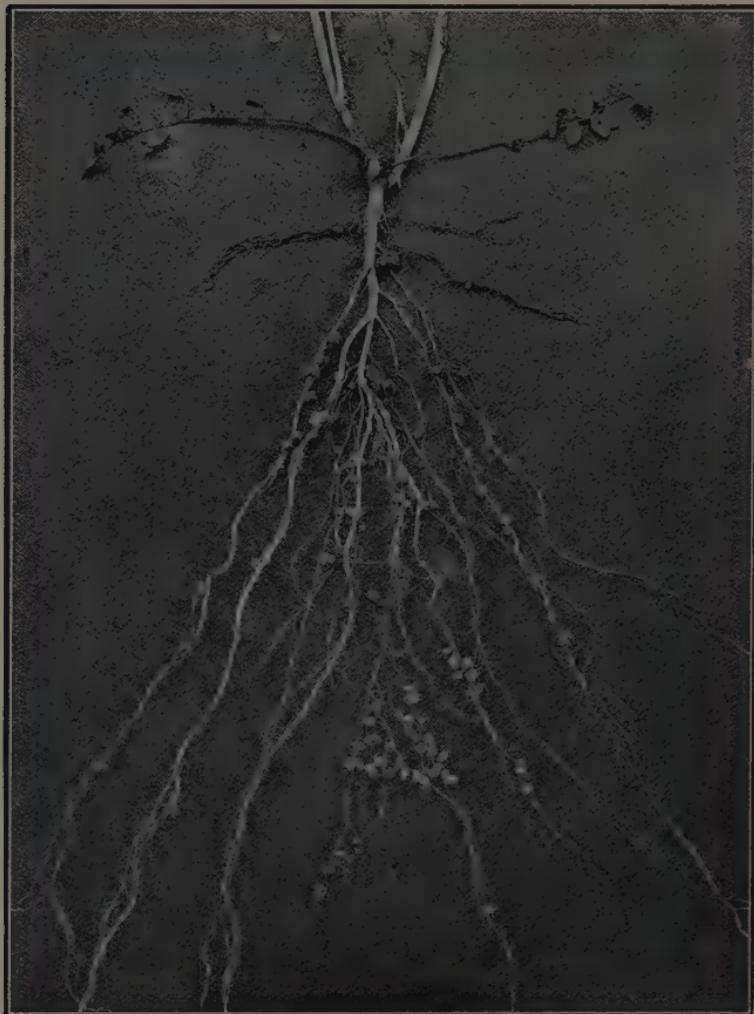
In the above estimation there is no value placed on the buttermilk. In this country, where it is used for feeding purposes, the buttermilk has a certain value, which should be deducted from the net profit. The price of casein is estimated at 4d. per pound, but this is a good deal above the value of casein taken from buttermilk. On account of its fat-content it has only half the value of casein from skim-milk, and would therefore be worth about 2d. per pound. The net profit by this system would thus be reduced somewhat. At the present time there is no factory in New Zealand handling as much as 5,000 gallons of buttermilk per day. It is only in a country like America, where large quantities of home-separated cream are collected in one place (as a rule, in a large town) that the buttermilk cannot be used for feeding purposes, and is nearly always run into the sewers. In places like this the system would meet with success.

Dry Farming.—More than a decade past I was at the end of a long day's journey through an arid district in Central Otago, tired and parched after the weary ride through burnt-up pastures and along a highway of dust, when I reached a Chinese mining encampment, and espied as refreshing a sight as the tired eyes of a man ever beheld. Perched on a bank at the side of the road was the thatched hut of an old Chinese minér, surrounded by a garden of flowers, a riot of colour, the brilliant foliage and wealth of bloom being in strong contrast to the dried-up country surrounding it—a veritable oasis in the desert. I pulled up my horse to discover if possible the secret of this apparent phenomenon, for the thatched roof discouraged the idea of water being responsible for it. The energetic little gardener gladly settled my doubts. His rake was the secret. "Plenty lake," he said, "ni' and morning. Ole China custom." Thus an excellent practical demonstration was afforded of the possibilities of soil-culture—of the power of a loose mulch in conserving moisture.—J. L. B.



ROSE SUGAR MANGEL SELECTED FOR SEED AT RUAKURA FARM OF INSTRUCTION.

This mangel has been selected for seed because of its freedom at Ruakura last season from rhizoctonia and rust diseases. In other respects it is a good mangel. Other varieties are also being grown for seed at Ruakura.



SERRADELLA.

A Serradella (*Ornithopus sativus*) plant grown at Ruakura Farm of Instruction, showing the great development of bacterial nodules found on the roots of this legume.

NITROGEN-COLLECTING BACTERIA.

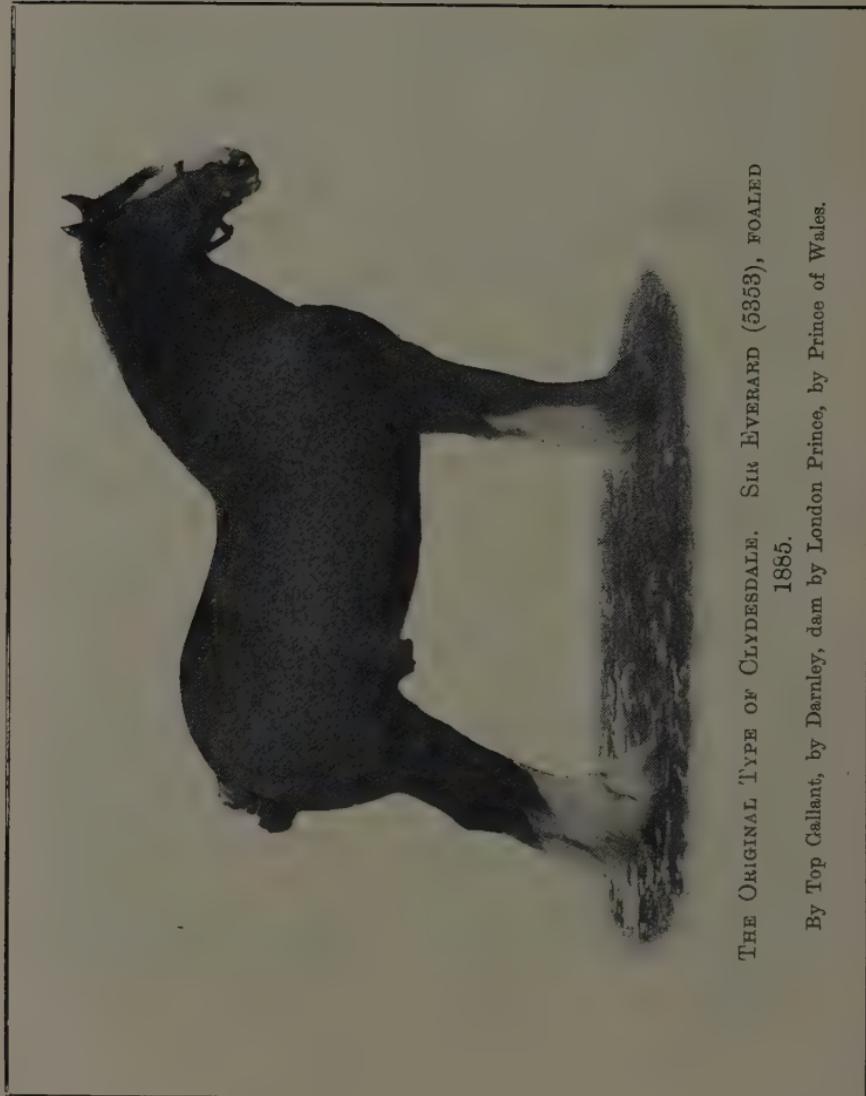
A SUGGESTIVE fact observed at Ruakura Farm of Instruction is that where stable manure is applied leguminous crops rapidly develop bacterial nodules, and that without inoculation; whereas on soil not so treated the nodules have been much later in appearing, and do not develop to the same extent.

In order to test this subject further, an experiment has been planned at Ruakura. Part of a plot of soil has received a dressing of farmyard manure but no inoculation, part inoculation and no farmyard manure, and the remainder neither manure nor inoculation. A variety of leguminous plants have been sown, and each row of these cross the treated as well as the untreated plot.

A similar interesting fact in this connection has occurred with the lucerne experiments at Ruakura: that is, where stable and poultry manure have been applied lucerne has grown in a gratifying manner, notwithstanding that no inoculation took place; also the fact that dressings of even more highly nitrogenous manures often give good results would seem to contradict the idea that such manures interfere with the virulence of the bacteria. On the other hand, where lucerne has been grown under ordinary field conditions, and without the application of animal manures, the inoculated portion is showing splendid development, while the uninoculated part is a failure. This definite response of legumes to a nitrogenous manure bears out the experience gained at Woburn Experimental Farm, England, where a number of manurial dressings were applied to a field of lucerne. The heaviest yield, judged by three cuttings in one season, was obtained from a plot manured with 4 cwt. of bonedust, 4 cwt. of sulphate of potash, and 2 cwt. of nitrate of soda per acre. The next-best result was from a plot manured in a similar manner, except that nitrate of soda was substituted for sulphate of ammonia.

Recently a singularly confirmative experiment was conducted in France. Portion of a lucerne-field manured with a heavy dressing of nitrate of soda gave a yield fourfold greater than the portion of the same crop which was untreated.

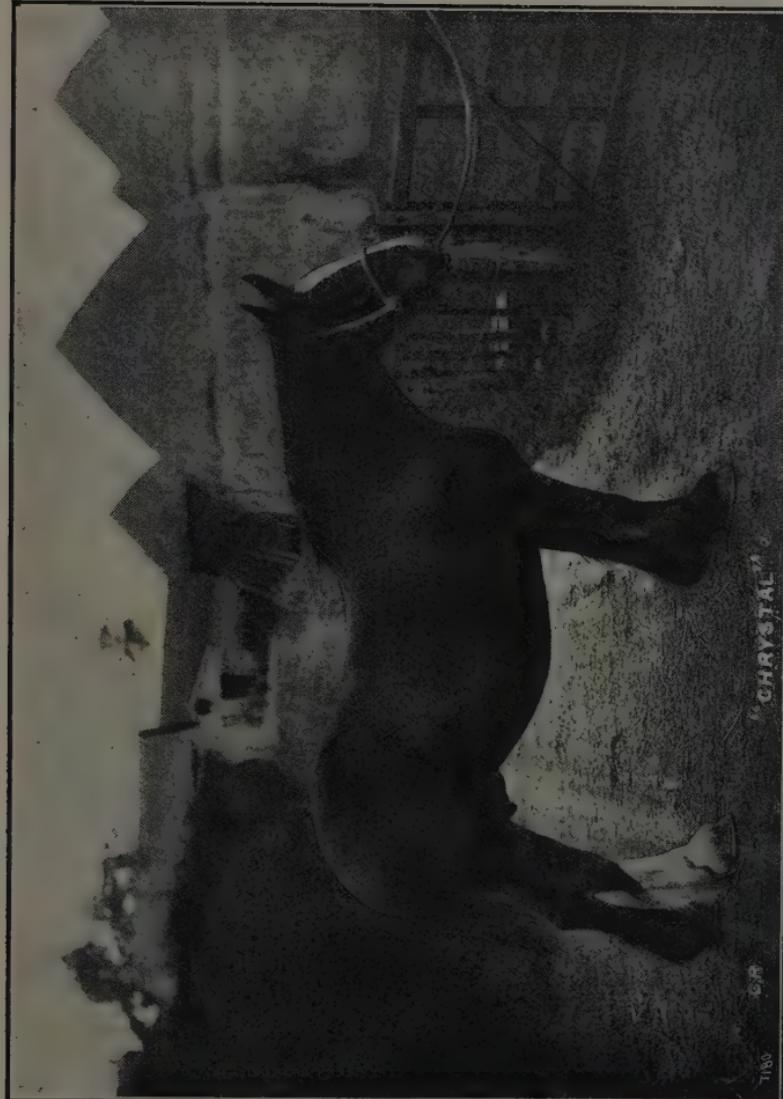
These experiences do not imply that nitrogenous dressings are always necessary, but they certainly go to disprove the truth of the statement that lucerne and other legumes do not require nitrogenous manure, as they obtain all the nitrogen they require from the air. In this matter, however—as in all problems affecting manurial and soil problems—it is well not to dogmatize. The experiences recorded here may, however, assist readers of the *Journal* in arriving at a better understanding of a most interesting phase of modern agriculture.



THE ORIGINAL TYPE OF CLYDESDALE. SIK EVERARD (5353), FOALLED

1885.

By Top Gallant, by Darnley, dam by London Prince, by Prince of Wales.



THE ORIGINAL TYPE OF CLYDESDALE. **CHRYS-TAL** (5387), FOALED 1882.
By Durnley.

SHORTHORN TYPES AT WERAROA EXPERIMENTAL FARM.



The Australian Milking Shorthorn.



A New-Zealand-bred Shorthorn.

AYRSHIRE CATTLE.

T. W. LONSDALE.

IN the work of choosing the particular breed of any race of live-stock which will prove the most profitable for the farmer to adopt, the first and most vital fact to be decided is—which type will best suit his environment; that is, which breed has been evolved by past generations of breeders for country most nearly approximating to his own. Practically every branch of the great families of domesticated farm stock have been developed on land and under conditions which have played an important part in creating the greatly divergent modern types of animals, now distinct breeds but which were once a common race. Striking illustrations of the part environment plays in the creation of type are provided by the Holstein and Ayrshire breeds. The former has been produced on the heavy marsh country of Holland, where an abundant strong feed is available; the latter has been created on the comparatively poor hills of Ayrshire. The Holstein reflects the value of its habitat—a large-framed beast capable of producing a great quantity of medium-quality milk; the Ayrshire is a small, hardy beast, with an exceptional power of searching for its food and making the best use of it in the production of milk.

While the Ayrshire has probably no equal on country similar to that of its native land, it should be equally at home in many districts of the Dominion, especially when the farmer comes to appreciate more the importance of calculating his returns on a net as against a gross basis. It is not so much what a cow returns in a season that determines her value as the actual profit remaining after cost of production has been provided for. In estimating a cow's productive capacity an important fact emphasized by herd-testing work must be considered—this is, that persistency of flow is the vital factor in the upsetting of previously conceived notions as to a cow's milking-power which systematic testing brings about; and persistency is a distinguishing feature of the Ayrshire cow, and persistency under adverse conditions. It is a common experience among owners of Ayrshire crossbred stock as well as of purebreds that, when drought or other trying weather-conditions are experienced, the Ayrshire blood distinguishes itself by holding on when many other classes of stock have lost their lactation-power under the climatic visitation.

Unfortunately in the past the Ayrshire has been largely known to New Zealand dairy-farmers through showyard types of the breed intro-



SACCHARINE,

A typical specimen of the fancy type of Ayrshire. A noted North Otago cow in the "nineties."



MAYFLOWER,

A member of the Moumehaki herd, a good type of a utility Ayrshire.

duced by old Scottish breeders, who brought a great love of the milking-cattle of their native land with them. The remarkable demand at the present time for dairy cattle with a pedigree of performance behind them has, happily, brought the utility type of Ayrshire to the front. This has been greatly facilitated by the work of the late Mr. John Speir, who was instrumental in introducing herd-testing work to Scotland, till to-day the possession of a milking pedigree has more to do with creating value for an Ayrshire than the best array of show-ring awards a man may possess. The milk-record Ayrshire bull is the most valuable beast in Scotland to-day, and the demand for this type of a dairy sire is increasing in all parts of the world.

In expressing satisfaction at the passing of the old showyard Ayrshire, it is not to be thought that the utility type may be deficient in breed characters. With the disappearance long since of the unfortunate rule regulating the length of the teat there is nothing in the accepted standard of the purebred Ayrshire which conflicts with milk-producing power. The ideal now being aimed at is an animal of good constitution, descended from milk-tested stock, and with undoubted Ayrshire character.

It has been declared that the Ayrshire is bad-tempered and troublesome. Any high-spirited animal can be made vicious by careless training, while, on the other hand, there is no animal which will respond so generously to careful and kindly treatment. This is so with the Ayrshire. The cows of the Moumahaki herd are as docile as one could desire, though they are inclined to timidity in the presence of strangers, especially at milking-time.

In conclusion, I would emphasize the fact that, while the dominant characteristic of the Ayrshire is ability to produce profitably on poorer types of country and maintain her yield under adverse conditions, she has undoubtedly the power of responding to liberal feeding and generous treatment. A good instance of this has been afforded by an investigation conducted at the Ontario Agricultural College. Three lots of cows—three Ayrshires, three Holsteins, and three Jerseys—were selected for a three years' test under equal conditions. Following was the result:—

		Milk.	Casein.	Fat.	Average per Cent.		
					Casein.	Fat.	
Ayrshires	..	..	lb.	lb.	lb.	
		77,734	2,023.30	3,115.36	2.60	4.01	
Holsteins	88,355	1,996.15	2,994.23	2.26	3.39
Jerseys	56,685	1,530.15	2,716.95	2.69	4.79

I candidly admit that there are great variations in individual animals of any breed, and that it is not an easy matter to secure any number of cows which will fairly represent their breed for the purposes of such a competition. We may be assured, however, that the Ontario College authorities acted fairly and to the best of their ability in this connection, and that the results published demonstrate what Ayrshire cows can do under the best milk-producing conditions.

"After the birth, to the calves must pass all your care; and from the first the herdsmen brand them with marks and the name of the stock, that they may know which they mean to keep for breeding. . . . Those you would fashion to rural use and end train whilst still calves, and enter on the way of taming them. The spirits of the young are pliant, their age still docile. . . . Give the untamed bullocks not grass merely, or the leaves of willows—sorry food—or the sedge of the fen, but spare not to pluck for them the corn; nor, as in the days of your fathers, let your cows after calving fill your pails with milk as white as snow, but let them consume all that their udders give on their beloved young."—*Virgil's "Georgics,"*
B.C. 37.



NETHERTON GOOD BONUS,

The milk record bull (imported from Scotland) at the head of the Moumabaki Experimental Farm herd.

MILK-RECORD HOLSTEINS.

FOUR photographs are herewith reproduced of the ancestors of some of the Holstein cattle purchased in the United States for the Department by Mr. W. M. Singleton.

Aggie Tehee De Kol, the granddam of one of the imported heifers, has a semi-official record of 724.77 lb. of fat in the year, the second largest record held at the time. She sold in public auction at £535. The sire of the imported heifer—Homestead Girl de Kol Sarcastic Lad, also the sire of two of the other imported heifers—has just on one hundred daughters in the Advanced Register, and has perhaps more daughters which have qualified in a semi-official test than any other bull. The three imported heifers referred to, by reason of having Homestead Girl de Kol Sarcastic Lad as their sire, are half-sisters to Woodcrest Rifton Lassie, which at twenty-five months old gave 726.65 lb. of fat in the twelve months, and thus holds the world's record for her class. They are also half-sisters to Woodcrest Homestead Princess, which holds a record of 751.72 lb. of fat for the year. A number of other half-sisters run over 600 lb. of fat at immature ages.

Ina Woodcrest de Kol, granddam of two of the other imported heifers, has a record of 694.31 lb. of fat. This cow has no less than seven Advanced Register daughters. One of the heifers has on her sire's side Grace Fayne 2nd Homestead as a graddam, a cow which held the world's record with 28.44 lb. of butter-fat in a week. She is considered one of the most remarkable cows of the breed.

Woodcrest Lady Maud is a half-sister of three of the imported heifers. As a three-year-old she gave 566.73 lb. of butter-fat, and she is by the same bull as the three heifers in question.

Pietje 22nd's Woodcrest Lad, to whom three of the imported heifers are bred, is a son of Pietje 22nd, a cow generally recognized as the best female Holstein imported into America, having made a six-months official record (an independent officer superintending each milking) of over 453 lb. of butter-fat. Pietje 22nd's Woodcrest Lad is the sire of the world's record junior four-year-old, which gave 24.48 lb. of fat in a week.

From the above it will be seen that several of the closest relations to some of the best foundation blood of American Holsteins have been secured for the Weraroa Experimental Farm herd.

All the cattle were purchased from Mr. J. W. Dimock, Woodcrest Farm, Rifton, New York, who, together with his manager, Mr. A. S. Chase, extended every courtesy to Mr. Singleton, and met him in a very liberal spirit in regard to the securing of exceptional animals for export.



PIETJE 22ND'S WOODCREST LAD.



WOODCREST LADY MAUD.



INA WOODCREST DE KOL.



AGGIE TEHEE DE KOL.

THE SEASON'S DAIRY PRODUCE.

D. C U D D I E.

UP to the end of November the export of butter and cheese has shown a good increase over that of last season, as the following figures indicate:—

		Butter. Cwt.	Cheese. Cwt.
1911-12—To Britain	..	95,664	91,939
To Vancouver	..	3,264	..
		98,928	91,939
1912-13—To Britain	..	100,056	120,297
To Vancouver	..	21,878	..
		121,934	120,297

This shows an increase of 23,006 cwt. of butter and 28,358 cwt. of cheese.

The exports for the month of November were as follow:—

		Butter. Cwt.	Cheese. Cwt.
1911-12—To Britain	..	67,864	76,815
To Vancouver	..	3,064	..
		70,928	76,815
1912-13—To Britain	..	70,800	91,216
To Vancouver	..	8,217	..
		79,017	91,216

Increases are thus exhibited of 8,089 cwt. in butter and 14,401 cwt. in cheese.

The weather-conditions this season have so far not been very favourable for the production of large quantities of milk, otherwise the increases shown would undoubtedly have been materially increased. While the quantity manufactured has thus been affected, an improvement has thereby resulted in the flavour of both butter and cheese.

The lower temperatures experienced have led to the delivery of the milk to the factories and creameries in better condition than would have been the case had the weather been warmer, and thereby have been more favourable to production.

A noticeable improvement in the quality of the butter coming forward to all the grading-stores can be reported. Many of the best brands are showing remarkable similarity in flavour, texture, and colour—a uniformity which did not obtain a few years ago. To a large extent this evenness of quality has been brought about by the pasteurization of the cream and the use of the combined churn and butter-worker. With only one or two exceptions, every dairy company making butter in New Zealand to-day has adopted the system of pasteurizing the cream before ripening and churning.

Examinations made of the various consignments of cheese coming forward for shipment have also revealed a gradual improvement in this product. The cheese shipped so far this year has been closer in body and of more uniform make than usual.

Judging by the improved quality of both butter and cheese, as disclosed at this end at the time of grading, our dairy-produce should undoubtedly give a larger measure of satisfaction to oversea buyers this season. Where defects are noticed, special efforts are being made by the Instructors to bring about the desired improvement, and it is gratifying to note that as the result of this assistance some of the brands which were scoring rather low last season are now well up to the average quality.

Budget of the Danish Ministry of Agriculture.—The estimated expenditure of the Danish Minister of Agriculture for 1911-12 amounts to £290,456—viz., £241,062 ordinary expenditure, and £49,394 extraordinary expenditure. The budget of 1910-11 amounted to £291,646, the actual expenditure in that year being £279,315.

“Some packers of boneless beef would be well advised in making an alteration in their method of cutting up the carcase. At present they divide the forequarter at about the fifth rib, making the shoulder and brisket one joint, and that an awkward one to pack; this leaves the midcut very large and almost impossible to pack flat. I would recommend that the carcase be divided about the ninth rib; then a horizontal section be made midway along the ribs, making shoulder and brisket; this would leave a much smaller midcut, and this could be packed without folding. By this means you would get four cuts—namely, shoulder, brisket, midcut, and rump.”—*A. Crabb, M.R.C.V.S., New Zealand Veterinary Inspector, London.*

ARTIFICIAL MILK.

THE New Zealand Inspector of Dairy Produce in London, Mr. Walter Wright, has forwarded an interesting account of an artificial milk being made in Frankfort, Germany, said to be the discovery of three German scientists, and which has recently been brought before the notice of British scientists and others.

The new "milk" is a synthetic product composed from cereals and water. The fat of the soya-bean is a considerable ingredient, and other fats, as well as beet-sugar, enter into it. The manufacture does not necessitate any costly machinery. The machinery acts as a digestive apparatus on the cereal fats, and seven hours' brewing brings out the perfected milk. In the course of the brewing a great deal of heat is applied, sometimes rising to 150° Cent. (302° Fahr.). It is not touched by the hand nor exposed to the air during the process. As soon as it is made it is poured into bottles; within about ten seconds the bottles are sealed and ready for delivery.

Poured into a glass, the milk is a thick, fatty liquid of the same colour as cow's milk. It has a certain degree of unusual flavour in the mouth, as well as a stickiness, which may be a symptom of its possible powers of nourishment. It can be made as thick as is desired, and the ordinary "family milk," which is produced by the process at present, is said to be 15 per cent. more nutritive than the best cow's milk. Commercially this quality of the milk could be sold profitably at 3d. a quart, and, although the commercial side has not yet been developed, there is already an idea of establishing milk-factories throughout England. It is supposed that two brewings a day would make the new industry pay.

The only considerable difference between this milk and cow's milk appears to be that it will give no butter. It yields cream, though the cream rises much more slowly than in cow's milk, because the fat is more finely distributed. It gives cheese, which can be sold at a profit at 3d. per pound. It turns sour in about twice the time in which ordinary milk is so affected. It can be used in coffee or tea, puddings, and so on. Various standards can be produced, and this controlled regularity of quality is claimed as one of the chief advantages it possesses. A patent has been taken out, and if the English analyses turn out to be as satisfactory as the German analyses are said to be, a factory will probably be put up in London at once. A great deal of the manufacture is automatic, but the new industry would open a large field of employment.

THE HEMP INDUSTRY.

W. H. FERRIS.

OWING to the unfavourable climatic conditions which have prevailed this season, the condition of much of the fibre reaching the grading-stores has been very unsatisfactory. The necessity of laying out the hanks of fibre on grass fields for the purpose of bleaching makes the miller of phormium dependent on the weather, and this season he has suffered severely in consequence. The heavy rains have made the fields quite unsuitable for their purpose—in fact, in some instances the bleaching-areas have been quagmires. So bad have the paddocks been in several cases that the owners have endeavoured to bleach by hanging the fibre direct on to wires from the washing-machines, with the result that the fibre has reached the grading-store in a green and tough condition, meriting only an inferior grade. Even where the fields have been in fairly good condition the delay in bleaching, owing to the absence of favourable weather, has seriously affected the colour. On top of this, diseased leaf has been fairly common, especially along the Manawatu line, the leaf in the Foxton district being, however, singularly clean this season. Three or four Foxton mills are producing fibre of fairly good quality, though not up to the standard of that of last season.

A large proportion of the fibre damaged by the weather has not been improved by the scutching, which, instead of correcting to some extent, as it could easily do, the damage done by bad conditions in the bleaching-field, has intensified the trouble. Some of this fibre has come to hand in a matted and towy state, with more than the usual amount of vegetable and gummy matter adhering.

Very little good-fair phormium reached Wellington last month from the main milling centres. Marlborough was the exception to the general rule. Four millers in that district are well maintaining their contracts for the supply of high-pointed good-fair and fine.

While the unsatisfactory weather has affected the quality of hemp coming forward, the output has also been curtailed for the same reason. The position is unfortunate, as such a large quantity of inferior fibre going on the market will certainly not strengthen the position of phormium fibre among manufacturers, and this at a time when there was an excellent opportunity for extending its use in the cordage trade abroad.

The general activity in the industry has extended to the west coast of the South Island. About six mills have been again put into commission, and these are all turning out a nice-coloured fibre, some of it reaching high-pointed good-fair. As in the past, the fibre from that quarter is exhibiting excellent strength. Westland millers have the great advantage of a capital water-supply, proved by the fact that the good colour being obtained is secured without the assistance of the patent washing-machines.

Some millers are sending in their tow bales in a very unsatisfactory condition. The bales are improperly pressed, and thus cause considerable trouble in the work of grading and dumping.

In sympathy, of course, with the general unsatisfactory quality of fibre, the tow reaching the stores is also disappointing, and here again the poor shaking it has received has in many instances not improved matters.

Stripper-slips, only a limited quantity of which has been shipped, are also showing the results of the bad weather-conditions. Where an attempt has been made to dry them under ordinary conditions the quality has been so unsatisfactory that several parcels have had to be condemned. The few millers who have installed special apparatus for washing and cleaning the "slips" have managed to turn out a passable article.

THE BINDER-TWINE POSITION.

THE bountiful crops in the United States—official figures declare the condition of the crops to be 20 per cent. better than last year—has meant a big consumption of binder-twine, with the result that supplies are scarce and dear in Canada.

THE PHILIPPINE POSITION.

THOUGH little is known as yet as to the effect of the disastrous typhoons experienced in the Philippines on the abaca-plantations, coming as they did after a bad drought it is not improbable that a serious shortage in Manila hemp supplies will result. This can hardly be without its good effect on the market position of phormium fibre for some time to come. According to American exchanges the typhoon of the 16th October virtually wiped out five towns or villages; while the typhoon at the end of last month was apparently much more disastrous, a Washington cable stating that 15,000 Natives were either killed or injured.

The British East Africa Fibre Association has been organized in London with the object of studying all matters relating to fibre-production and to disseminate the latest literature referring to fibre in various parts of the world. Best methods of grading, and best types of machinery to be used, are among the objects of the association.

THE MANILA POSITION.

PRESENT STATUS OF THE ABACA INDUSTRY.

From the *Philippine Agricultural Review*, October, 1912.

SIMULTANEOUSLY with the gradual fall in the price of abaca since the beginning of 1908 came a gradual decline in the condition of the industry in general. The abnormally high prices paid for the fibre between 1903 and 1907 had caused so much enthusiasm on the part of the planters all over the country that abaca was planted in any locality, under any conditions, and in any manner. While the price remained high the planters realized large profits, but when the crash came many plantations were found to be so badly neglected, having such poor soils, or managed under such unfavourable conditions, as to make impossible the realization of profits from them without the exercise of judicious methods of cultivation in some and a complete renewal of others. These methods, however, were not practised, and, worse than that, whatever little attention had been given to the cultivation of the plants and the quality of the fibre was gradually withdrawn, on the foolish plea that the price of the fibre was too low to justify any such expense or trouble. It was, however, a question of only a few months when the natural consequences followed. The quality of the fibre turned out became so low that the price hardly paid for the expense of cleaning it and transporting it to the market; and the economic standing of the majority of the planters began also to decline gradually, which placed them completely at the mercy of the local buyers, whose status was not affected by the decline in the price and quality of the fibre, except perhaps for the better.

Such has been the general condition of the abaca industry for the past three years. The Bureau of Agriculture, through its Fibre Office, has made every possible effort to induce the planters to adopt better methods of cultivation and fibre-extraction, but there has been no general or widespread improvement. There has always been the danger that a calamity in the form of an unusually severe typhoon or an exceptionally long and severe drought might so seriously and permanently injure the industry as to set it back many years. What was feared happened in the latter form, but fortunately with an

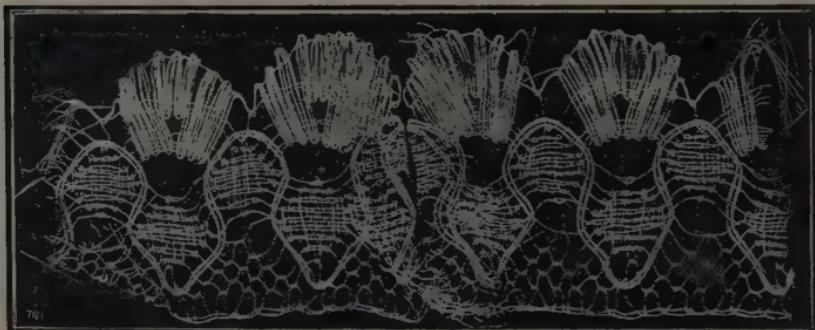
apparent tendency to cause an effect directly opposite to the one anticipated.

As far as can be learned, the effects of the recent drought, which is claimed by many to be the severest and most prolonged in the memory of the present generation, was to retard the growth of the abaca-plants, and thus possibly diminish the production of fibre until the young shoots should have matured. In southern Luzon the effect of the drought was more serious, and it is reported that a large number of stalks fell over, thus permanently injuring the plants. This, however, could have taken place only in those plantations which are either too cold or are unfavourably situated, in both of which cases their renewal or transfer to better localities is the only disposition that can be made of them.

In Albay, where the drought wrought the greatest damage, the effect may in one sense be considered a blessing to the province as a whole. It seems to have awakened the producers from their lethargy, and to have inspired them with a clear idea as to what they should do to improve their plantations and their product, and also to better their economical standing, so as to render them capable of using improved methods of cultivation, which are the only means of checking the effects of future droughts.

BANANA-FIBRE.

FRANCISCO BOLOUHA, C.E., Para, Brazil, informs the *Scientific American* that for over twenty years the Brazilians have made banana-flour and banana-cloth, while lace made from the fibre of the banana-tree (from which the cloth is also made) is sold locally for 6d. a foot. The illustration of banana-lace is taken from the *Scientific American*.



THE APIARY.

NOTES FOR JANUARY.

F. A. JACOBSEN.

ANOTHER TRYING SEASON.

As with last season, the weather-conditions have not up to the present been particularly favourable for beekeepers. Whereas the early part of last year was exceedingly dry, it was very wet in the beginning of this year, and many beekeepers have in consequence fed to their bees more than a ton of sugar-syrup. Those less energetic have lost numerous colonies through starvation. Under these unfavourable conditions it is gratifying to know that some good must have been done by weak, diseased colonies dying out. Though brood-rearing has been curtailed through lack of stores—colonies being weaker than is usual at this period in consequence—should fine weather be experienced from now on a good crop of honey may be expected.

NOURISH YOUR BEES.

If any quantity of honey is gathered that is inferior to a later crop, it should either be extracted and kept by itself or taken out of the hive and stored in the combs for feeding purposes later on. As an example, thick manuka honey should be removed from the hive and stored before the clover flow is expected, being replaced again in the autumn for winter food. This system keeps the quality of honey at a higher standard and permits of more being produced. The inferior grade is almost as good for winter stores, but never winter bees on honeydew. With a spring like the past one it will probably not be necessary to do this, as in most cases all the honey gathered will be required for brood-rearing and for building up for the main clover flow.

CLOVER HONEY.

In the United States of America beekeepers look forward to large yields of nectar from various sources, the principal being alfalfa and various clovers. In Australia eucalyptus is expected to yield the main crop, while in New Zealand the white-clover plant takes precedence as a honey-producer. This is very fortunate, as the honey from this source is perhaps the finest in the world, and always sells for a high price in comparison to that gathered from other sources. For the

benefit of those not knowing what clover honey is like, it may be described as having a very pale-yellowish colour, a heavy thick body, and shows marked clearness when held to the light. The aroma is sweet and delicate. When granulated it is almost white, with an exceptionally fine, smooth grain.

EXTRACTING.

Extracting generally commences about the end of December, but the season is the determining factor. The better the season the earlier the commencement. Those who have apiaries away from home and who do not wish to build a house for extracting would find a high-walled tent very useful, and, in fact, everything that could be desired. The tent is pitched over a 2 in. by 3 in. wooden frame, which may be left at the apiary, the canvas being removed and stored when finished with. This style of out-apiary extracting-house is very popular in the North Island, but, of course, after the work is finished the honey must be shifted to a central depot. Supers are stored within the tent-frame and covered with a hive-top and otherwise left exposed to the weather.

The work of gathering the crop may be done at one or several different times, but the majority of beekeepers prefer to extract only once or twice. Those extracting more often do so before all the cells are capped. They claim as a result that the bees gather more honey. Then it has to be artificially ripened. If everything is left until the end of the season one extraction does the lot, and, the cells being all capped, the honey produced is usually well ripened by the bees. After extracting, a procedure with which everybody in the business is well acquainted, it remains for the beekeeper to put his produce up in the best possible form. Much is lost by neglect in this respect. The first thing to study is quality, but even the inferior grades are improved if the produce can be classed as

WELL-RIPENED HONEY.

The system that is advocated in the Department's bulletin No. 18 is that of testing the specific gravity. It has been found to give every satisfaction, and is perhaps the only reliable method in practice. Numerous tests have been made, and the conclusion arrived at is that clover honey having a specific gravity of 1.420 or over is fit for market. Mixed varieties average about 1.415, but anything below this is liable to granulate softly and ferment. Numbers of cases are known where beekeepers have suffered in their trade connection by the honey they have marketed in one season fermenting after reaching the buyer. For the purpose of testing, a Twaddel's hydrometer is recommended. This costs about 3s. 6d. or 4s. The bulb part of the instrument is

allowed to sink into the honey until it remains stationary. Say it registers 84: each degree is equal to 5 degrees specific gravity, so that $84 \times 5 = 420 + 1,000 = 1.420$ specific gravity. Partially granulated and granulated samples, or honey that is too thick to test in the ordinary way, are treated in the following manner: Weigh 8 oz. or 1 lb. of honey and add the same weight of warm water. Stir thoroughly, after which reduce to about 60° Fahr., when it will be ready for testing. Say the hydrometer gives 1.205, by adding 205 it will give 1.410, which will be the specific gravity of the honey. Hydrometers are made in different scales, and for this work one with a lower scale is necessary.

ARTIFICIAL RIPENING.

If your produce is not up to the mark it must be artificially ripened in shallow tanks having a broad surface, these being exposed to a hot dry atmosphere. This permits the surplus moisture to evaporate, thereby making the honey denser and consequently of a higher specific gravity. Care should be taken never to expose honey for any length of time in a damp climate, as in this way moisture can be absorbed and fermentation started. Sealed combs or sections that are to be kept for any length of time or for show purposes should also be stored in a dry place, otherwise they will "weep"—that is, honey will ooze out of the cells through the wax cappings.

MARKETING.

Presuming the honey you have for sale is in first-class condition, it is necessary, when not sold in bulk, that it be put up attractively. Gaudy labels should be avoided, and screw-top 1 lb. and 2 lb. clear-glass jars be used for preference. These can be bought in quantity at a reasonable price, and beekeepers should club their orders, thus enabling them to secure a reduction in price. At present tins are used somewhat extensively, but glass will eventually supersede these. Honey sold in bulk should be in 56 lb. tins, as being easier than 60's for calculation.

WAX - EXTRACTING.

When a person has an apiary of more than a dozen colonies a quantity of miscellaneous wax must be accumulated. Burr combs, foul-broody combs, drone combs, &c., become valuable when melted up and put into commercial form. The cheapest way to do this depends on the number of colonies in the apiary. In a former issue of the *Journal* a capping-press was recommended. This is more suitable for large apiaries. The smaller man would hardly have sufficient work for one of these. A solar wax-extractor would suit his purpose better. These are stocked by the appliance-dealers, but in case a beginner

would like to make one himself the following dimensions are given: Length, 4 ft.; width, 2 ft.; depth of body, 4 in.; wax-receptacle at lower end of body, 6 in. by 8 in. The sash is fitted with two sheets of glass, with 1 in. air-space between them. The extractor can either be mounted on two movable legs placed at one end or on a revolving wheel, so as to be easily turned to the sun. At the lower end, where the melted wax accumulates, is fitted a long tin dish with sides sloping



SOLAR WAX-EXTRACTOR.

inwards to the bottom and divided into two or three compartments. To prevent the wax from sticking, these should be soaped every time they are used. A large sheet-iron tray is fitted into the upper portion and is used for placing the fragments of wax and old combs on, and across the lower end of this, a couple of inches from the wax-receptacles, some wire gauze is placed to catch any dead bees and *débris* that will not melt. The extractor has a disadvantage, in that it can only be used when the sun is shining, and then it has been known to register considerably over boiling-point. It should be placed in a sheltered spot. A handy man could make one easily. The timber should be well seasoned, and screws used instead of nails. The external part should be painted black, to attract as much heat as possible.

A D U L T E R A T E D H O N E Y .

RECENTLY the Orchards and Gardens and Apiary Division of the Department received for examination two samples of honey. No. 1, procured from a shop in Dunedin by the Government Apiary Instructor, was marked "Pure Extracted Clover Honey." No. 2 was received from a private gentleman, who obtained it from another shop in Dunedin. It was marked "Best Clarified Honey." These samples were submitted to the Dominion Analyst, who reports as follows:—No. 1, "Pure Extracted Clover Honey"; No. 2, "Best Clarified Honey," &c. No. 1 contains approximately 37 per cent. of cane sugar. No. 2 contains added invert sugar. Neither of these samples is wholly genuine honey.



A GOOD STYLE OF "OUT" APIARY.

ORCHARD WORK FOR JANUARY.

W. A. BOUCHER.

CULTIVATION.

CULTIVATION of the soil as recommended for previous months should be continued. By this means alone, during warm, dry weather, can the natural moisture be retained in the soil to keep the trees in vigorous growth and satisfactorily develop the crops.

CODLIN-MOTH.

It must not be supposed because orchards or gardens have been previously sprayed for the control of this pest that further treatment will not be required. On the contrary, it is most essential that crops of apples, pears, and quinces should be thoroughly sprayed with arsenate of lead about the 8th or 10th of January. The reason for this is that about the middle of the month there is usually a heavy flight of moths—that is, in districts where the pest has not yet been practically brought under control. But even in districts where the moth is much reduced it will be found that about the middle of January more eggs are laid than at any other period during the season, so that the January spraying, to protect the fruit when the eggs have hatched, may be regarded as most important.

BRONZE BEETLE AND LEAF-ROLLER CATERPILLAR.

In some localities these pests will have ceased to cause trouble for the season, but in others they will still be more or less active. Some growers complain that arsenate of lead is not as effective as it might be in controlling the bronze beetle. The beneficial action of the spray may be considerably increased by adding a little resin solution to the arsenate of lead.

APPLE AND PEAR SCAB.

Very much depends upon the climatic conditions of each season as to whether late sprayings are required for the control of apple and pear scab. Warm dry weather is unfavourable for the increase and spread of these fungus diseases, while cold showery weather considerably increases the difficulty of keeping them under control, also necessitating the use of the Bordeaux mixture, 4-5-50 formula, up to a later period than would otherwise be the case. Except in districts that are so



BLOSSOMS IN WELL-KEPT DOMESTIC ORCHARD.

far free from codlin-moth the arsenate of lead would, of course, be added to the Bordeaux mixture. No other preparation has been found as effective as the Bordeaux mixture for the control of fungus diseases, although growers sometimes complain of the russetting that follows its use. Experiments are now being carried out with lime-sulphur solution, which some authorities recommend as a valuable substitute.

LEECH.

This pest, which will still be active, can be readily kept under control by spraying with arsenate of lead, using the same strength as for codlin-moth. Hellebore powder is also an effective remedy, and is preferable for some varieties of plums which are susceptible to injurious results from the use of arsenate of lead. Neglect to control this pest, both on young and old trees, will result in such injury to foliage as to seriously affect the trees not only during the period of attack, but also by reaction during the following season.

TOMATOES.

Growers will find that the fungus diseases attacking tomatoes, as well as the caterpillar which is so often troublesome, can be kept under control by spraying with the Bordeaux mixture 4-5-50 formula, to which will be added a $1\frac{1}{2}$ lb. of a reliable brand of arsenate of lead.

RED SPIDER AFFECTING THE PEACH.

J. A. CAMPBELL.

THE amount of damage often done by a bad attack of red spider is only too well known, especially to peach-growers. Owing to the tender nature of the peach-foliage, it is a very difficult matter to find a spray that will satisfactorily control the insect without injury to the leaves. The recognized method of controlling red spider is to spray the trees thoroughly during the dormant season with an oil spray, but, where this has not been done, the following summer spray made of whale-oil soap, &c., which is being used with very satisfactory results by many growers of the Hastings district, is recommended:—

Boil together for about half an hour 5 lb. of whale-oil soap, 7 oz. of sulphur, and 5 oz. of caustic soda in 3 gallons of water. Make up to 40 gallons. If possible, select a dull day for spraying, or spray in the evening.

TO MAKE WHALE-OIL SOAP.

Warm 14 lb. of whale-oil, and in another vessel dissolve 2 lb. of caustic soda. Let this cool until just warm, and then slowly add the warm oil, stirring well. When cold this will set into a hard soap.

FRUIT BY POST.

BRINGING THE PRODUCER INTO CLOSER TOUCH WITH THE CONSUMER.

THE Post and Telegraph Department, with the co-operation of the Railway Department, the shipping companies, and the carrying companies, has completed a scheme whereby the consumer can obtain direct from the producer parcels of fruit at a minimum of cost. The proposed regulations, which appear below, show that the method of ordering the fruit is not only very simple, but provides an excellent means whereby the business will be conducted with as little friction as possible. It is to be hoped producers will avail themselves of this excellent opportunity of marketing their fruit to the best advantage. If only good uniform fruit is supplied there is no reason why the great bulk of locally consumed fruit should not be disposed of through this channel, to the mutual benefit of the consumer and the producer. Following are the regulations governing the scheme, which, however, may be slightly amended, as the railway rates are not finally approved:—

ORDER-COUPONS FOR SUPPLIES OF FRUIT.

On and after the 1st January, 1913, fruit order-coupons are to be available for issue at all post-offices.

The charge for each coupon (postage to destination included) will be 2d.

Coupons are to be filled in by the purchasers and handed to a postal officer with the cash for remittance.

Coupons will be addressed as desired by purchasers, or (when no direction is given) to the representative of the most convenient fruitgrowers' association. A list showing the addresses of fruitgrowers' associations is to be exhibited at every post-office.

Except for supplies of fruit, to be packed in conformity with the inland parcel-post regulations, the use of coupons must be restricted to orders for delivery to addresses at places that can be reached by railway or steamer.

Persons ordering supplies by coupon must prepay the advertised price of the fruit, all transit and delivery charges, and the ordinary commission on postal notes necessary for making the remittance.

The postal notes are to be crossed "—— and Co.," enclosed in the coupon, and forwarded by the postal officer to the address given.

The number of the coupon issued is to be written, by the postal officer, on the butt of the postal note handed to the purchaser. At non-postal-note offices, postage-stamps may be enclosed in coupon, and the delivery office will issue and pay postal notes in lieu if required.

The postal officer delivering the coupon to addressee is to keep record of the number of the coupon, name of addressee, and date of delivery.

The addressee is to be required to return one portion of the coupon after the order has been supplied.

The postal officer is to mark date of supply against the relative entry in his record and file the coupon for six months.

The Department acts as agent for the buyer only, and assumes no responsibility for the quantity, quality, or condition of the supplies, nor for delays that may arise in the execution of orders.

FREIGHT SERVICE.

The transit and delivery charges (payable at time of ordering) have been fixed as follows:—

For each "quarter-case," "packet," or "half-case," not exceeding 42 lb. gross weight—

Railage (if any) 6d.

Steamer freight (if any) 6d.

Wharfage (if any) 3d. at each port.

Delivery 3d. within one mile of principal centres only.

An additional 3d. will be payable for delivery outside above limit and at other centres, as notified in Railway Department's time-table.

For each "full case" not exceeding 56 lb. gross weight—

Railage (if any) 6d.

Steamer freight (if any) 8d.

Wharfage (if any) 3d. at each port.

Delivery 3d. or 6d. as above.

Packages weighing more than 56 lb. must be paid for at the rates notified in the Railway Department's schedule.

All "case lots" must be delivered by the vendor at a railway-station, or at a wharf served by steamer having contract with Railway Department.

MIXED FREIGHT AND POSTAL SERVICE.

In order to prevent unnecessary handling in transit, several packages of fruit for delivery from the same post-office may be packed together in one crate or case and consigned to the Postmaster of the distributing post-office with one railage or freight service, payable on delivery.

Liquid-tight packing will not be insisted upon for parcels enclosed and forwarded in this manner, but each package must bear postage-stamps to the value of the charge at parcel-post rates, must be fully addressed, and must not exceed 11 lb. in weight. The total gross weight of the crate or case must not exceed 56 lb., and the total postage affixed to packages must amount to at least 2s. 6d.

The Postmaster of the distributing office will take delivery of such crates or cases at railway-station or wharf, and will deliver contents from his office by ordinary parcel-post service.

If so requested, the Postmaster will return empty crates, &c., at the risk and expense of the owners.

PARCEL-POST SERVICE.

The rate of postage to be prepaid is 3d. on parcels not exceeding 1 lb. in weight and 1½d. for each additional pound or fraction of a pound.

Parcels of fruit must—(1) be marked "Perishable"; (2) not exceed 11 lb. in weight; (3) be packed so as to avoid leakage.

Such parcels will be accepted on the understanding that the Department assumes no responsibility for the condition of the fruit on delivery, and reserves the right to destroy any parcel likely to do injury to other portions of a mail.

At Ruakura Farm of Instruction the worst peach to take curl is Early Yellow, while black aphid first appeared on Early Bell and Cramer Roberts Clingstone.

VINE-CULTURE UNDER GLASS.

S. F. ANDERSON.

IN the majority of the cool-houses north of Wellington the earlier-ripening vines, such as Black Hamburg, Foster's Seedling, Duke of Buccleuch, &c., will have fruit nearly ready for cutting. With these all danger of mildew will be over, but it is just at this time that red spider may be troublesome. If regular syringing and some sulphuring has not been done in the earlier stages of ripening, these two insects are not easy to control until the fruit has been gathered.

Where mealy bug has not been checked by cyaniding when the grapes are commencing to colour, its rapid increase at this time makes it almost impossible to get clean fruit. Using a strong force of water with the garden syringe is the best remedy, but it is at the expense of the bloom and the good appearance of the berries. In cutting the bunches of grapes some growers cut the lateral off below and above the bunch to provide a little handle. This should not be done, as it amounts to a heavy summer pruning, and the vine has already received all the check it should by the stopping of the fruiting-shoots. As soon as the fruit has been gathered the vines should be allowed unrestricted growth. The reason given by some growers, that an early cutting-back of the laterals causes the buds at the base to plump up and so be better fitted for sending out strong shoots the following season, is not a sound one.

Should late varieties of grapes such as Gros Colman, Alicante, Lady Downes, and others, which will not be ripe for some time, be affected with mealy bug at this time of the year, they can be fumigated with good results at the early stage of ripening. Care must be taken that the fruit and foliage are perfectly dry, as there is a risk of not only scalding the foliage, but also of depositing poison on the surface of the berry.

The late-ripening grapes are still liable to mildew, so that an occasional dusting with sulphur should be given them.

In syringing vines where the fruit is approaching ripeness, do it so that the water falls on the bunches; do not syringe upwards, as this takes the bloom off. In houses where early and late kinds of vines are growing together the amount of air given them requires to be regulated to suit the late rather than the early varieties.

THE FARM GARDEN.

W. H. TAYLOR.

VEGETABLE - GROWING.

EACH year brings its lessons. One thing emphasized recently is the uncertainty that attends many of our best efforts because of the changeableness of weather. One of the reasons why gardening is difficult to learn is because we have but one spring each year, and one must get grey-headed before experience is very ripe, and still we only learn a little. This spring has been the most backward I remember from the point of view of growing spring crops. Strangely enough, nothing appears to affect the time for *asparagus*. This came into use in the latter half of September, as usual, and most valuable it has proved. It is an automatic supply. Once established it will, if fairly treated, come all on its own each year at the time when vegetables are at a premium. A difficult spring serves to emphasize its value, and to impress the wisdom of establishing a good bed.

Spinach sown at the end of February was ready for use all winter. Not being in request at that time, it grew and strengthened, with the result that there has been plenty for use during October, and it was still in good supply in November, an indication that there should be a good patch next spring also.

Silver-beet has been useful also, and as it was not in requisition till spring it has not palled.

Spring cabbage has been slow in coming in. Now, it is well known that of all cabbages the spring cabbage is the one most appreciated. If this crop is late it may disorganize plans. For one thing, if it is late it is pretty certain it will be cut before the plants are well grown, when it may take four to equal one good one. It is quite certain we cannot hurry them. We cannot start earlier, for if the seed was put in early enough to make any difference the plants would all bolt off to seed. There is no doubt that half-grown cabbages just beginning to fold in are excellent eating, provided they are freshly cut. The wisest plan, therefore, seems to be to try and plant four times as many next spring.

Sea-kale.—Manure and boxes that have been used for blanching should have been cleared away long ago. If this has not been done, do it at once, for the fullest possible exposure to light and air is

necessary for the development of good crowns. Usually the stools, after a few years' forcing, become crowded. They should be thinned out so as to give each stem proper exposure. The precise number to leave must be determined according to what is to be used to cover with. Some people use kerosene-tins. These will cover three strong stems. A kerosene-case is a better cover, and will enclose ten or twelve stems. All this should be planned ahead, and the clumps planted in accordance. The number of shoots on each stem are generally in excess; three shoots on a strong stem are ample. Rub off all above that number. Young plants raised from whips should not be allowed more than two crowns. Seedlings may grow as they will.

Leeks.—The main planting should be done between the third week in December and the second week in January. A later planting is advisable, but the plants must be from a later sowing, or it will be useless for the purpose of extending the supply. The first planting will supply large leeks, and these will be in use from mid May till about the same time in September. They then begin to run to seed. The later planting will prolong the supply till the beginning of November. They will not be very large.

Brussels sprouts should be out by now.

Broccoli should be planted during the first two weeks in January. Broccoli require considerable space to get good heads. Rows should be 3 ft. apart, and should not be closer than 33 in. in the rows. If the varieties are well selected and true to name, they should be in cut from June till well into December, beginning with Adam's Early and ending with Sutton's Late Queen. It is, however, somewhat difficult to get seed true to name.

Cabbages should be planted in quantity early in January. Blair's Phenomenal is an excellent variety to come in quickly, but will not stand all winter. Garden Drumhead or the ordinary Drumhead are both hardier, and about equal numbers of one of these varieties should be planted, as they stand longer.

Plant *savoys* also and *Scotch kale*. The kale are of greater value in the colder districts than in the north. They require frost to make them tender. Savoys should be planted at once.

It is advisable to use stable or farmyard manure for broccoli and Brussels sprouts particularly. These are essentially crops that require to be well grown, and this kind of manure tends to keep the soil in good working-order. It also encourages strong growth, with a correspondingly extensive root system. This also tends to break up and aerate the soil. It is a good plan to arrange to manure the

ground somewhat heavily for these crops, and use the site the following season for root crops, such as carrots and parsnips. The soil should be in excellent condition for the latter, and no manuring would be then required.

Continue to sow *lettuce* in drills as previously advised, and thin out to the required distances.

Sow *turnip* if required, in small quantity.

Radishes do best in soil that is free from lumps. Ground that was well manured last season is best. Fresh manure tends to produce a superabundance of top. The long-rooted varieties are best for hot-weather work.

Peas are still to be sown twice a month, the last sowing being made in mid January. Crops sown after that are very poor—in fact, not worth putting in except for some special purpose.

French beans may be sown as late as the middle of February, though these later-sown ones will not give a full crop; yet they are specially valuable, coming after peas are past.

Now is the time to plant autumn giant *cauliflowers* for use at Easter-time. This is perhaps the most valuable crop of cauliflowers throughout the year, providing something good when the summer crops are past. Give them good soil with plenty of manure, or humus of some kind, for they have to make their growth during the hottest and driest part of the year, and quick growth makes them better able to survive attacks of the diamond-backed moth.

Tomatoes are in these days a precarious crop unless regularly sprayed. The frequent losses from blight would nearly always be averted if the plants were sprayed about every third week with 4-4-40 Bordeaux mixture, beginning before the plants are put out. It is but a trifle to spray them while they are in the boxes.

Marrows, *pumpkins*, *cucumbers*, &c., very often seem unwilling to set fruit. Some think it is because the flowers are not fertilized. It is, of course, in no way due to this, because we know that when cucumbers are grown under glass care is taken to keep all male flowers pinched off, so as to prevent fertilization, because bearing seed is a tax on plants which are expected to carry heavy crops. The cause of delay in setting fruit is rampant growth of leaders and not giving the side shoots an opportunity to grow fruit. Cut off the ends of the strong runners, and the laterals soon bear fruit.

Perhaps there never was a season when cultivation was so urgently needed as in this one. Rain has been frequent rather than in large volume, and though the undersoil is not so wet as usual, yet the top has been much more difficult to work. The hoe or cultivator can

hardly be used too much. Every time the surface closes it should be broken up. Crops will not succeed when air is unable to penetrate the soil, nor can the roots work freely in lumpy soil. It is by attention to small and apparently insignificant details that success is attained. Thoughtless workmen frequently waste their efforts. It is not much use loosening the surface soil between crops if it is left indented everywhere by footmarks, for the first stiff shower renders such marks a solid cake. In garden work, where the soil is usually worked by hand, the crops are placed closer than in farm work, and more careful work is therefore necessary. The comparatively confined space renders this possible. Small things make a difference. As an illustration of this, suppose there are a number of rows of cabbages that require moulding up. The average man will start by moulding up the outer side of the first row. This is wrong, because he must walk on it to hoe the inner side. The way to start is to do the inner side of the first row, then the outer side. Continue this throughout, and when the work is finished there is not a footmark left. The importance of such trifles is only appreciated by those with some knowledge of the theory of vegetation.

SMALL FRUIT.

Loganberries.—Present indications are that this fruit is destined to become the most popular of all fruits in country gardens. It is a sure doer, exceptionally heavy cropper, and easily managed, nor does it spread in the manner of blackberries. I am not impressed with it as trained to stakes in the open garden. What it wants is a fence or wall of some kind. What better than farm outbuildings? At the present time the new rods are lengthening out at a great rate. Tied to stakes, they become tangled up with other growth, and are frequently broken. Fastened to a wall, a strip of cloth and a tack here and there keeps them securely in place, and the handiness of it all facilitates fostering manipulation. Those who have them in such positions should, as soon as the fruit is past, cut off the laterals that bore it—not right back, but far enough to admit light and air to the new rods; but in cases where the present bearing-wood will be removed in winter it may with advantage be taken out entirely as soon as fruit is past. Remember that the new rods will bear abundant fruit next season. They will bear again the following season, but seldom bear a third time. This should be sufficient guide as to what wood to remove.

Gooseberries.—As soon as the crop is gathered the bushes should be sprayed with 4-4-40 Bordeaux mixture as a preventive of leaf-spot. If there is no disease to be seen, so much the better, but still spray,

for the spray is a preventive, not a cure; and if you allow the disease to defoliate the trees you will get no fruit next year. Before spraying, it is an excellent plan to put the bushes into shape. It is easier to tell what requires to come out when the leaves are on than when the branches are bare in winter. Whole branches should be removed where they are crowded, and all young shoots that have lengthened out much may be cut back if desired. Some good cultivators do all their pruning at this time in preference to winter, the idea being that it encourages the proper development of fruit-buds. To the same end they do the manuring at the same time. I believe this is sound practice, particularly the manuring. The whole of the pruning, however, must not be done if the spur-pruning system is to be followed; but there are many who believe in taking most of their fruit from young wood, and do not spur-prune. My own observations, spread over a good many years, convince me that the latter plan is best on light soils and in hot climates. Spur-pruning is right in cold climates and on heavy soils.

FLOWER-CULTURE.

Most of the arrangements for summer and autumn flowers will be complete by this time. There is still time to fill up vacancies either by planting from the reserve supply or sowing seed of quick-flowering annuals.

Rhododendrons, azaleas, and camellias will be benefited by a mulch of some kind, to keep the soil moist. The alternative is to keep the surface loose. Spent hops from a brewery are excellent material for mulching; a layer six or more inches deep may be used. Heavy soil is much improved by the use of hops. Manure of a littery nature, however, is as good as anything when available. Midsummer and autumn is a time when many preparations for the following season should be made. The time of flowering of some subjects may be determined by the time of sowing; some will not readily lend themselves to this arrangement.

Antirrhinums sown in autumn flower early next summer. If sown in spring they will flower in autumn, but *Canterbury bells* sown in spring will rarely flower till the following year.

Wallflowers, when well grown, are very welcome spring flowers. The seed should be put in at once. The way to raise the best plants—that is, the most bushy and hardy—is as follows: Sow seed at this time in boxes of light soil. The soil should be kept moist, but not wet. At this season of the year protection from the sun and its drying influence is required rather than warmth, therefore a frame is useful because of the facility with which it can be shaded. The young plants should be pricked off as soon as they can be handled. It is

a mistake to delay this operation. The soil should be free and open, but with plenty of loam in it—in other words, not too light. This pricking-off should be into boxes, putting the plants about $2\frac{1}{2}$ in. apart. In ordinary practice the plants are left in the boxes till the beds are ready for planting. It is better to plant them out in a nurse bed as soon as they have filled all the soil in the boxes with roots. They should not be placed far apart; 4 in. or 5 in. will do. This extra shift will have two effects: it will increase the stock of roots and multiply the shoots, resulting in well-rooted and dwarf bushy plants, which move well into their final quarters.

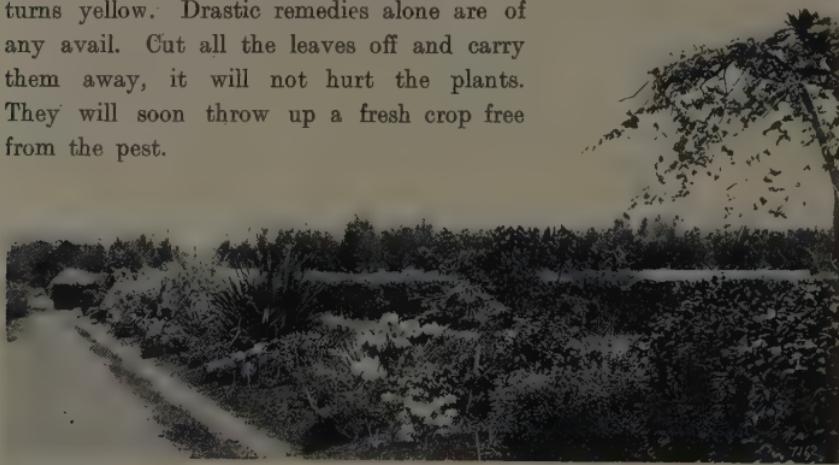
Stocks, of East Lothian, Intermediate, and Brompton strains, may be sown now to flower next season. Most other things may be left for a month or two.

Carnations.—These highly popular flowers are now in many varieties and strains. Some of them, of which the Marguerites are a type, are not of a lasting character, and are raised from seed. Marguerites were in the first instance little more than annuals, but their life is now prolonged over several seasons. They, must, however, still be raised from seed. This should be put in at any time from now till the end of March. Sow in boxes. The perpetual carnations are the most important, not only for their lasting properties, but it is in this race we find the real flowers. The race is divided into sections. Selfs are of one colour only; flakes have one colour arranged in longitudinal bars on a white ground; bizarres are the same as flakes, except that there are two colours in place of one; picotees have the colour in a narrow ring round the margins of the petals; fancies are those that, from the irregular manner of their markings, will not come under any of the other headings. Included in the latter section are some of the most beautiful varieties, though the selfs are the most generally popular. The various sections are still further divided according to colour, &c. The cultivation and propagation of carnations is of the simplest. Given well-drained soil of a free non-binding character they are seldom any trouble, but they will not do on puggy soil. They require full exposure to the sun. Snug corners are not suited to them. They may rightly be termed children of the sun. It is best to renew the plants after the second season. This is not always necessary, but it is always advisable; for one thing, the flowers deteriorate after that time, and sometimes the plant wears out. Now is the time to propagate by the best method. This is by layering. Layering is accomplished in this way: Clear away the leaves from the base of some of the lower shoots, loosen the soil beneath, and, if convenient, add some fresh soil, mostly composed of sand. Sometimes this is quite necessary, as some kinds have short stiff shoots that will not reach the ground. Now on the underside of each shoot cut a tongue. Begin by pressing

the knife in just below a joint, not through it, carrying the knife gradually through and slightly upward till about half through the stem, then turning it sharply upwards for about three-quarters of an inch. When the shoots are thin or brittle great care is necessary to avoid cutting them off altogether. The tongue being made, the shoot is to be pegged into the soil in such a way as to ensure keeping the cut open, leaving the upper part of the shoot clear of the soil. Convenient pegs are made of wire about four times as thick, and bent to the same shape, as a ladies' hairpin, but double as long. The layers may with advantage be watered after hot days: it will certainly hurry the rooting process. The layers should be fit for removal in from four to six weeks. I may point out that this is one of the things that require doing at a special time. Delay may mean failure. The object is to take advantage of the grass being in a state of growth; then rooting is quick. Wait till growth is slower and it will take longer; leave it till growth is dormant and they may not root at all. Notice particularly that the tops of the leaves are not to be cut. The only removal is that of leaves that interfere with layering. The growing points are an essential part, and it is retaining these that makes rooting by layers so quick as compared with cuttings, because with the latter the tops must be cut off; they would otherwise wither for want of sap.

Clumps of *lily of the valley* will be the better for a layer of leaf-mould or very old manure, a couple of inches deep. This will keep the roots cool and help the crowns.

Violets.—A common trouble at this time is red spider on the leaves. This robs the foliage of sap, and it turns yellow. Drastic remedies alone are of any avail. Cut all the leaves off and carry them away, it will not hurt the plants. They will soon throw up a fresh crop free from the pest.



ENTRANCE TO NURSERY AT WERAROA EXPERIMENTAL FARM.

PURPLE SPROUTING BROCCOLI.

THIS vegetable is not as well known as it should be in colder districts. In taste it is somewhat similar to asparagus, the edible portion of the plant being really the seed-head and the soft green stems which carry it. These are nipped off. They reproduce themselves several times over. The plant is very hardy, and will live through an English winter. Planted in the late summer, it comes



in at a convenient time in the early spring. There are two varieties, the white and the purple; and it is used in England both in the winter and in the early spring. According to Sutton's "Culture of Vegetables and Flowers," "it is a favourite vegetable in the kitchen because of its freedom from attacks of all kinds of vermin." The plant illustrated was from seed sown at Ruakura on the 27th February of this year, the photograph being taken on the 23rd October.

Mr. A. W. Green, Horticulturist at Ruakura Farm of Instruction, supplies the following note on this vegetable: "For winter use sow

in October and transplant in December. For spring use sow in February and transplant in April. The soil should be rich, liberally manured with stable manure, and deeply dug previous to planting. The plant succeeds best in a strong loam, but can be grown in most soils if well manured. Plant 2 ft. 6 in. apart. The plants grow from 2 ft. to 3 ft. high. The leaves are much indented, are of a purplish-green colour, and are short, with long leaf-stalks. The head, though close at first, becomes quite open from the leaves when ready for use. Small leaves are intermixed with the head, and it is from the axils of these leaves that the second crop of sprouts arises. When gathering the first crop care should be taken not to break off the sprouts below the lowest pair of small leaves. The second crop will then soon develop."

In an amendment by the United States Department of Agriculture of the regulations governing the certification of purebred stock, it is stated that no animal or animals registered in the Holstein-Friesian Herd-book of Canada shall be certified by the Secretary of Agriculture as purebred unless such animal or animals trace, in all crosses, to registered animals in the country where the breed originated, or to animals which are proved to the satisfaction of the Department to be of the same breed and to have been imported from the country in which the breed originated.

Experiments with Lucerne (Univ. of Missouri Agric. Expt. Sta., Bull. 106).—Experiments have been carried out at a large number of centres in districts where lucerne is not easily grown, with a view to determining the best means of securing a profitable stand on various soils. Quarter-acre plots were laid out, and dressings at the following rates were applied: (1) 12 tons farm-yard manure per acre; (2) 3,000 lb. lime per acre; (3) 300 lb. bonemeal per acre; (4) no treatment. Each of these plots was subdivided into three; one third received no treatment, another third was inoculated with soil from an old lucerne-field, and the remaining third, in addition to inoculation, was to be cultivated with a disc or spring-tooth harrow after each cutting of the crop. At a considerable number of centres it was found altogether impossible to obtain a successful crop; at most of these the subsoil—a very stiff clay—appeared to be the factor responsible. Of the fifty-eight successful trials, farmyard manure proved beneficial in 86 per cent. of the cases, bonemeal in 65, and inoculation in 62. The soils were well supplied with lime to start with, and in only about 10 per cent. of the cases did the special application appear to have aided in securing a successful crop. Where thorough cultivation was carried out after each cutting it was found possible to keep down the grass and weeds, which constitute one of the great difficulties in growing lucerne on many soils in the State.

THE POULTRY INDUSTRY.

F. C. BROWN.

TABLE POULTRY.

ON a visit of instruction to a small farmer the other day—at least, to his wife, for it was she who conducted the poultry section of the business—I was shown the returns from twenty head of four-and-a-half months old cockerels, a cross between Black Orpingtons and Black Minorcas. This was no less than 9s. 4d. the pair. The birds had not been specially fattened, I was informed, but were in good condition. This result was so gratifying to the farmer that his interest was awakened in poultry. He declared to me that there was certainly money in the business at these prices, and as a surety of his earnestness he intimated his intention of at once providing an up-to-date poultry-house, so that the birds could be kept under decent conditions, conducive to yet better results, while the wife could then attend to the birds in comfort. Formerly he considered the wheat used for the fowls had been wasted; he was now coming to think it had been turned to good account.

I do not say that this is a common experience, for the birds marketed were of decent size, had been hatched at a good time, had been decently fed, and caught a favourable market. Good Black Orpington cockerels or any other utility type of bird found among the heavier breeds would probably bring as good a price, while the pullets would make profitable layers. Though table poultry is now at a high value, and fancy prices will always be secured for really choice carcases, the main thing to look to in a flock is the laying of eggs; but the maximum returns from the industry will never be secured till both eggs and carcase are sold to advantage.

INFLUENCE OF FOOD ON EGG-COLOUR.

It is well-enough known that certain foods will influence both the colour and flavour of eggs. Watercress, lucerne, &c., will impart the desired rich colour to the yolk, while the use of mangels and turnips result in the yolks being pale and unattractive. The sickly appearance of the yolk of eggs from birds confined in a yard without any green vegetable matter or a judicious supply of animal food being provided has done as much to discourage the use of eggs as the occasional rotten or stale egg at one time so common on city markets. For some years I have been puzzled to account for a very objectionable green colour in the yolk of duck eggs forwarded to me from time to

time. About two years ago I was investigating the trouble where it occurred, and the idea came to me that the acorns, falling thickly about the fowl-yard from oak-trees on an adjoining property, might be responsible. At my request the ducks were kept confined to the run where the acorns were most abundant. The result confirmed my suspicion. All the eggs were affected. Acting on my advice, the ducks were removed to runs where they could not get any acorns, and the trouble at once disappeared. Repeatedly since then I have received duck-eggs with the interiors having the characteristic dark-green colour (quite useless for marketing), and in every case acorns have been found to be responsible. It is intended to test this matter on one of the Department's poultry farms, in order to determine the amount of acorns which can be fed to ducks without the egg-colour being affected, and what percentage can be safely fed (in a ground condition) to fowls.

JANUARY WORK.

It should be needless to remind readers that January is a good month for cleaning the plant, and overhauling incubators and brooders. Dirt means vermin, and vermin means poor returns. It is bad to overstock a plant with poultry, but it is worse to overstock it with insect-life. The cleaning of houses should be particularly thorough where it is intended to remove old stock from them in order to make room for young birds. I would recommend in these cases that the insides of the houses should receive a good coating of tar, so that all crevices and possible hiding-places for vermin may be covered up, and thereby render subsequent spraying-work thoroughly effective. Much of the spraying done is largely nullified by the pest life being out of its reach in crevices and cracks. I have seen myriads of red mite under "blisters" formed in whitewash in a fowlhouse which to the eye was a picture of cleanliness. There is no better spray than a strong sheep-dip solution.

Birds it is intended to breed from should be kept in the best of health, and there is nothing more conducive to this than a good range, so that ample exercise may be secured. Confinement, indeed, is bad for all classes of stock, except, of course, birds being prepared for market. This statement should not be confused with the management of the heavy layer in the cold months of the year, when to obtain the best results the layers should be confined in a spacious open-front house on cold, wet, and windy days.

January is a good month to detect the hens not worth keeping a second season. Any birds indicating that they are on the eve of a long rest should be marketed at once. A sure sign of this is the apparent shrinkage of the comb, with, of course, the bloom of this gone. Then the egg-basket also shrinks, till the point of the breast-

bone comes so near the contracted pelvic bones that the expert in "systems" would hardly credit the bird having any capacity to lay at all. The man who never tires of studying his birds, and thereby develops his powers of observation, should be able to detect at a glance the bird that is failing in egg-production, a failing which, as often as not, is the result of a weak constitution.

DEVELOPING THE LAYER.

A common mistake in these days of running a large number of stock in a confined space is to keep the young birds under what might be termed hothouse conditions. The consequence is they are overforced, and have not, therefore, the necessary stamina demanded of the profitable laying bird. All young breeding and laying stock should have as much range as possible. Early maturity is all very well in its way, but the poultryman can pay too dear a price for it. The heavy layer must have a sound constitution and be well developed before she is called upon to commence her productive season. Small wonder so many breeders experience disappointment, when they expect a flock of coddled pullets to lay heavily in the most trying months of the year. Not only will the improperly developed bird not lay as well as she would otherwise do, but her eggs will be small. Then, there is little doubt that the ovarian troubles being now commonly experienced are in large measure due to heavy laying strains not being properly prepared for the great strain of producing their artificial egg-yield. To sum up, early maturity too often means false maturity.

Another weakness in developing the layer is in overforcing it by means of stimulating foods. The growing pullet should be fed with great care. Green food should be provided in abundance, and crushed oats should form a large percentage of the grain ration. Animal food should be sparingly given, especially when birds are indicating early maturity. Pullets at about four months old are very apt to catch cold if the weather is at all changeable. The cause should, if possible, be discovered and removed. It is often brought about by ill-ventilated quarters and overcrowding. A little Condy's fluid (put a teaspoonful of the fluid in a quart bottle of water, and mix a teaspoonful of this mixture with the drinking-water) is generally effective in checking this trouble. Shelter from wind and shade from sun are necessary for the good health of the birds, whether old or young.

THE LAYING TYPE.

That there is a laying type has passed beyond the problematical stage. Just as there is a table bird, so is there a bird indicating in her appearance the power to produce a large number of eggs. As there are exceptions to every rule, so does it sometimes happen that a bird of rather a different build to that looked for will be

found highly profitable. This does not prove that the "laying type" theory is not correct, but rather that our knowledge of it is not as keen as it should be. Many who are now awakening to the value of type in indicating laying-power are naturally—with that enthusiasm common to progressive poultrymen—looking for anything which will guide them in their search for knowledge on this subject. Maybe they will happen on photographs of birds published to illustrate type and the exceptions which prove the rule. I would urge them not to place too much reliance on the photograph in this connection. There is probably no domesticated animal which refuses to allow the camera to impart to paper a fair representation of it as does the fowl. I have seen many a good photographer patiently wait for hours to secure a good picture of a high-type layer, and never succeed in doing it. On one occasion I endeavoured to secure a faithful picture of a champion layer, and the three negatives secured were so different from each other that one unacquainted with the facts would have refused to believe they were obtained from the one bird. Sometimes it is possible to picture a bird by means of the camera just as it should appear, but more often than not a photograph of a fowl gives a flat contradiction to the saying that the camera cannot lie. It is therefore well not to attach too much importance to photographic reproductions in judging type.

In talking of laying type, the main fact to be considered is the securing of breeders. Because a freak type may be a good layer, what guarantee is there that its descendants will lay? If it is used, the progeny will probably be of all shapes and sizes, with nothing to distinguish them for productive capacity. Successful breeders the world over—no matter what the class of stock—aim at developing even flocks or herds of the animals they are breeding. Type is the first essential, and uniformity of that type is the next consideration. With fancy poultry—that is, any breed conforming to approved fancy standards—it is easy enough for the breeder to judge of the quality of a bird; but with utility birds, where egg-producing power is the chief consideration, how is any one to judge of quality unless there is a laying type, a standard of utility characters? I attach very great importance to the question of a utility standard. It is not every one who has the natural eye for form. Even men of long and successful experience with utility poultry quite fail in picking out the laying type, whereas with a definite recognized standard, with points apportioned for each desired quality, they may meet with fair success after patient study and the requisite experience of the standard. It must be admitted, however, that, no matter how perfect the system of judging (not by arbitrary measurements, but by points for essential qualities), a really successful judge cannot be manufactured; just as the successful poultryman is born, not

made. Where the standard is most desired is that the man who has a natural eye for the layer can thereby indicate how his judgment has been arrived at.

MARKETING EGGS.

When the returns from a successful enterprise are being considered as a guide to extended action sufficient investigation is usually not made as to the methods employed in order to ensure the success achieved. For instance, in considering the successful trial shipment of eggs to the Vancouver market by the Department, sufficient stress will probably not be laid on the fact that the eggs which comprised the shipment were undoubtedly fresh, spotlessly clean, and inviting, that they were carefully graded, and were packed by an expert. Arriving in Vancouver as they did in good order, they would have realized the top ruling rates in any market. If it is important to pack only guaranteed fresh, clean eggs for the local market if the highest price is to be secured and a valuable connection established, it is even more important that these details should be strictly observed for an oversea market; and, more than this, that the eggs should be infertile, that they should be uniform in size and colour, and that in every way they should appeal to the consumer abroad as being a choice and reliable product. If a good impression is created on a market, good business will generally accompany subsequent supplies; but if an unsatisfactory shipment is made, a good name thus lost is very hard to regain.

THINGS TO BE REMEMBERED.

If fowls are confined and have little exercise, with no dust-bath, they are apt learners of feather-pulling.

It is a simple matter to hatch chicks, but it is not so easy to rear them. Copy nature as closely as possible.

It is impossible to rear any kind of poultry without care and cleanliness.

Are your fowls so tame that you can go among them without frightening them? More eggs, better fertility, and stronger chicks will be the result.

Don't have dirty nest-boxes. Washing eggs is slow work, while many are broken in the process.

When you begin to know a little about poultry-keeping it is only then that you will realize what a lot there is to learn.

If your chicks look well and are doing well don't change the method of management because some one has advised you to. Leave well alone.

Breeding-birds should be purchased some time before the breeding season. A bird must have an opportunity to get over the fretting stage.

THE CONTINENTAL POSITION.

In 1875 France was about the only country that supplied England with eggs, and the latter then imported them to the value of from £1,200,000 to £1,400,000 per year; but now the imports of eggs into France far exceed the exports, as will be seen from the following figures:—

				Imports.	Exports.
1896	..	..	..	156,980	341,900
1910	..	..	..	515,400	168,325

In Belgium, where most of the farms are less than 25 acres in size, poultry-rearing has increased in a remarkable degree, owing no doubt to the united efforts of the members of the National Federation of the Poultry-rearing Societies of Belgium, of which the number of branches rose from 29 to 131, and that of its members from 2,107 to 6,630, between 1898 and 1909. The Government gives an annual grant of £480 to this association, in addition to which it provides for elementary courses of instruction in poultry-farming. Belgium has made a speciality of rearing fowls for the table as well as of fattening for export.

In Prussia the Government aid for the promotion of poultry-farming (chiefly on peasant farms) amounts to nearly £7,000 per annum. In this and other States of the German Federation experimental schools have been founded, having a twofold aim—viz., poultry-rearing, and training for the same. Small breeding-centres have also been formed, known as Zuchtstationen and Muster-Geflügelhöfe, under the management of the most active among the agriculturists. About three thousand of these Zuchtstationen exist in Germany, two thousand three hundred of which are given up to poultry-farming.

Poultry-rearing in Denmark is carried on under careful Government supervision, three officials having been specially appointed to give instruction in poultry-rearing in the rural districts.

The number of fowls reared in Denmark increased from four millions and a half to eleven millions and three-quarters between 1888 and 1909, so that there are now 439 fowls to every 100 inhabitants.

The Russian Government is trying to encourage poultry-farming by granting travelling scholarships on condition that the holders of them shall organize special courses of instruction as soon as they return to Russia.

In 1910, 2,998 million eggs were exported from Russia.

EXPORT OF EGGS.

PARTICULARS OF THE VANCOUVER SHIPMENT.

DETAILED information of the trial shipment of eggs to the Vancouver market is now to hand. As already announced, the eggs reached the oversea market in excellent condition, thanks largely to the care taken of the consignment by Mr. Howarth, the chief engineer of the s.s. "Marama," who has supplied the daily temperature of the cool-storage chamber during the voyage. An average temperature of 40° was maintained, the minimum being 37° and the maximum 45°.

It will be seen from the accompanying report of the Vancouver merchants who sold the eggs, Messrs. F. R. Stewart and Co., that the most successful method of packing was considered to be the placing of the eggs in cardboard fillers and depending on the cool-storage on board ship to arrest deterioration. The sterilization process—preserving by the cabinet system—evidently does not appeal to the Vancouver firm. An important fact brought out by the test was that eggs which had been a month in one case and ten days in the other in cool-storage prior to shipment, arrived as well as the quite fresh eggs placed direct into the steamer's cool-chamber. This shows that eggs can be stored from month to month in a cool-store without detriment to their quality.

Methods of packing adopted : Cases 1 and 2, eggs placed direct in cardboard fillers ; 3 and 4, sterilized eggs in cardboard fillers ; 5, eggs previously stored at temperature of 33° Fahr. for a month and placed in cardboard fillers ; 6, eggs treated in similar manner, but held at 33° for only ten days ; 7, eggs packed in husks ; 8, eggs sterilized and packed in husks.

Following is the special report of Messrs. Stewart and Co. on the shipment :—

"With regard to the two cases of eggs which were shipped by the New Zealand Government to Vancouver for inspection here, the shipment arrived in very good condition and opened up well. We had a few bad eggs out of each case, and thought those in cases marked No. 1 and 2 were very nice stock, about equal in quality to the fresh eggs that we receive from Ontario. For flavour we only tested three eggs out of each case, and did not find any objectionable flavour in the eggs, excepting numbers 7 and 8. We do not say that the slightly objectionable flavour that was found in these eggs was caused by their being packed in husks, and it is possible that other eggs in the same cases may have been perfectly free from any bad flavour.

"We do not favour packing eggs in husks. This method was adopted in Canada some twenty-five years ago, but has been abandoned for at least twenty years in favour of the cardboard filler. We have found the cardboard fillers of good quality, such as you used in the other cases, to be the most satisfactory, and we would recommend all shipments of eggs coming from New Zealand being put up in these cardboard fillers. It is necessary to use Excelsior in packing at the bottom of the case, and also at the top, so that in the event of the case being turned upside down or on its side there is no damage done to the eggs.

"It is needless to say that for our market strictly fresh-laid eggs, promptly gathered, carefully candled before being shipped, and packed in the manner which we described, will be the most satisfactory for this market. We can often use eggs that have been in storage for ten days or thirty days, or even longer, if they have been kept in proper condition and are carefully selected by competent men before being shipped.

"We did not care very much for the appearance of the sterilized eggs and saw no particular merit in them, although it is possible that their keeping-qualities may have

been better than the others. There has been no opportunity so far of demonstrating this.

" Some years ago a large quantity of the eggs used in Canada were treated by some preservative process, but there is very little of this done now. It has been found that the most satisfactory way to handle the eggs is under cold storage.

" From the samples we have seen we are satisfied that eggs can be shipped to advantage from New Zealand. The question of whether business can be developed will depend on the prices quoted. We would be glad to get into communication with the shippers at the New Zealand end, and no doubt would be able to make arrangements to take quite a few cases on each steamer during the months of October, November, and December. This would have been a good season to have experimented, as our egg-market has been abnormally high.

" CONDITION OF EGGS ON ARRIVAL.

Cases marked.	No. 1 Quality.	No. 2 Quality.	Cracks.	Rots.	Broken—useless.
No. 1 ..	27 doz. ..	2 doz. and 8	2 ..	2	..
No. 2 ..	25 doz. and 6	4 doz. and 6	..	..	..
No. 3 ..	25 doz. and 6	2 doz. and 6	1 doz. and 8	..	4
No. 4 ..	28 doz. ..	1 doz. and 6	5	1	..
No. 5 ..	28 doz. and 2	1 doz. ..	10	..	..
No. 6 ..	28 doz. and 11	1 doz. and 1	..	..	..
No. 7 ..	17 doz. and 10	12 doz. ..	1	1	..
No. 8 ..	28 doz. and 4	1 doz. and 6	..	1	1

" FINANCIAL STATEMENT OF SHIPMENT.

Dr.	£ s. d.	Cr.	£ s. d.
240 doz. eggs, at 1s. ..	12 0 0	Sale of 234½ doz. eggs at 1s.	17 11 9
Sterilizing 90 doz. at 1½d. ..	0 11 3	6d. (5½ doz. eggs were distributed free amongst merchants as samples)	
Chilling 60 doz. at ½d. ..	0 2 6		
Husks ..	0 1 0		
8 cases at 1s. 8d. ..	0 13 4		
1 case fillers ..	0 9 0		
Freight to Vancouver ..	1 10 0		
Bill of lading 2s., cartage 3s. ..	0 5 0		
 Total cost c.i.f. Vancouver ..	 15 12 1		
Charges at Vancouver—			
Duty and clearance ..	1 12 1		
Wharfage ..	0 1 0½		
Selling commission ..	0 18 2½		
 Total cost of marketing shipment ..	 £18 3 5	Balance (deficit) ..	 0 11 8
			£18 3 5."

The actual cost of marketing cases No. 1 and No. 2 (these not having to bear any expense for chilling or sterilizing, and providing highly approved samples) was £1 4s. 4½d., or about 5d. a dozen, this including 1d. a dozen duty. This means a credit balance of 3s. 6½d. on these two cases; and if the eggs distributed as samples be considered, the return on the 60 dozen was 5s. 9d., the eggs being purchased at 1s. a dozen and sold at 1s. 6d. a dozen. The eggs in question, therefore, realized a shade over 1s. 1d., or 1s. 3½d. net in Vancouver.

PASTURES AND CROPS.

NOVEMBER.

OFFICERS of the Fields and Experimental Farms Division of the Department report as follows on the condition of the pastures and crops during the past month :—

BAY OF ISLANDS.—The weather was exceptionally dry for November, only 0·67 in. of rain up to the 25th, when the drought that had prevailed broke, and a heavy drizzle set in from the east, and continues while writing (26th). This will considerably benefit grain crops and pastures, and hay crops, some of which are now being cut. Farmers in the north are going in more for fertilizers for improving their pastures, and are very desirous of obtaining a near and cheap supply of lime.—*W. J. Dunlop.*

WHANGAREI.—A very dry month—no rain until the 26th. Pastures are beginning to show signs of the dry weather, but still there is plenty of feed. The rain on the 26th freshened the pastures. All early crops are looking well, and in some cases they are cut and in the stool. The late crops of oats are very short and poor. Potatoes are showing very little sign of blight, and there is every prospect of a fair crop.—*A. P. Speedy.*

AUCKLAND.—The weather-conditions during the past month were very unsettled and at times very cold and wintry, particularly on the 10th, when persistent southerly winds blew with moderate force, accompanied by several sharp showers, followed by a heavy hailstorm which swept over the greater portion of the district. However, it did not last long, the weather clearing up again before midnight. Then a few fine days were experienced, after which rain set in again. I may say it continued to rain off and on pretty well to the close of the month. Shearing operations were greatly delayed in consequence. The cold nights, too, were very severe on the newly shorn sheep. Stock of all classes are looking well and in the pink of condition, owing, no doubt, to the abundance of feed in the pastures. Oats, wheat, barley, and potatoes are looking splendid. From reports so far the potato crops are very free from blight this year. On the whole the country never looked better, and the farmers, I think, are enjoying a good season.—*R. Rowan.*

TE AROHA.—During the early part of the month there was cold, showery weather with cold winds, the latter part being dry with cold nights, which affected the maize crops in the Bay of Plenty district. Pastures are looking well, and the butter-fat output is phenomenal—in fact, up to date constitutes a record.—*J. L. Morris.*

HAMILTON.—The past month was the best we have had for a considerable period—a few wet days and several nights somewhat cold. Crops are rather backward, owing to the wet and cold in the earlier part of the season. All classes of stock are looking remarkably well, and prices are high for fat, store, and dairy animals. Pastures being good, there will probably be a large area saved for hay this season.—*J. Kerr.*

CAMBRIDGE.—November was a fairly dry month. Three or four frosts occurred, the last one affecting the potato crops in different parts of the district. Owing to the drying winds feed was more or less at a standstill, but with the recent genial moisture the growth will soon be once more evident. All stock are looking remarkably well.—*A. Clapcott.*

KING-COUNTRY.—The weather was variable, with warm rains and cold winds. Frost visited the district one night last month and wrought havoc amongst the potatoes, which up to that time were looking healthy. Dairying is now in full swing, with the prospect of a good season being experienced. Field work is being pushed ahead now the weather is favourable. A large area of turnips will be put in during December.—*B. Bayly.*

BAY OF PLENTY.—The weather during the month was pretty dry, and rain was needed for maize crops. The weather broke on the 26th and nice warm rain fell. Most

of the maize-sowing throughout the district is now completed, and some good takes are to be seen in many localities. Potatoes so far are pretty free from blight, and fair crops are expected. Feed throughout the district is plentiful. Dairy factories are now in full swing.—*J. Case.*

OHAKUNE.—During the earlier portion of last month bitterly cold winds prevailed accompanied by heavy rains, snow occurring on the higher levels. The weather moderated about the 16th, and from this on to the end of the month a period of ideal growing conditions was experienced. Pastures utilized for dairying are lacking in quality, and this, combined with the adverse weather-conditions over the earlier stages of the month, had a diminishing effect on the milk returns. Early-sown oats, checked by the unfavourable weather and sodden state of the ground, improved within the month. On areas sown later this cereal has made favourable progress and presents a healthy appearance. Mangels sown within the month have broken ground, and give promise of good strikes. Potatoes, owing to the frosts, have been more or less affected according to locality. The weather has greatly retarded shearing operations.—*P. Barry.*

STRATFORD.—Very heavy rain fell in the early part of last month, followed by fine dry days, the ground thereafter becoming dry owing to the cold winds. Near the end of the month we had three days of very cold wet weather, which was very trying on the stock, but after a few warm days the effect of the rain was plainly visible. Most of the cropping is well in hand, and some of the more enterprising farmers are availing themselves of the Department's offer and are going in for lucerne plots.—*Austin F. Wilson.*

HAWERA.—Variable weather was experienced throughout November, ending up on the night of the 29th with a cold southerly gale with rain. Conditions, on the whole, were favourable to the growth of pastures and green crops, though grass would improve in substance with a little more sunshine. Turnips, rape, and mangel crops have made a good start, and the few cereal crops to be seen are promising well, also potatoes, which so far show no sign of blight. The milk-supply at factories is very heavy and is of good quality.—*A. J. Glasson.*

WANGANU.—The unenviable reputation acquired by the weather during the previous months did not improve during November. The climatic conditions for the first half and the last few days of the month were inimical to growth of all vegetation, and to the prosecution of farm-work. From the 18th to the 25th a dry period was experienced with milder temperature, but still much wind. On the 26th and 27th copious warm showers fell, which would have been of incalculable benefit if the temperature had not again later become wintry. Pastures are supplying a fair quantity of feed. Crops of all kinds are backward, and early potatoes are showing indications of blight.—*C. Watson.*

MANGAWEKA.—The weather during the past month was varied and unsatisfactory, the majority of days being wet ones. Occasional outbursts of muggy heat were followed by drenching rains, very detrimental to all outdoor work and shearing. There was a sharp frost on the 19th which did considerable damage to potatoes and tomatoes. Shorn sheep appear to have come out of the wool remarkably well. The grass country is looking very fine and grain crops are fair, and farmers would appreciate good weather so that ploughed land could be worked up for sowing. Small birds are working havoc with peas that are appearing above ground.—*J. A. Melrose.*

WAIROA.—The weather during the past month was of a changeable character, wet and fine days alternating throughout, finally culminating in a series of violent southerly gales, with a heavy snowfall on the ranges in the back country. All shearing operations were greatly retarded on account of the variable conditions prevailing, otherwise stock and crops of all kinds are looking well.—*T. F. Mullaly.*

HASTINGS.—The weather for November was very changeable—exceptionally so for this district. Rain was general, and at times the weather was very cold. Early in the month several feet of snow lay on the higher ranges. Pastures and all crops are looking exceedingly well, and the prospects of a good season are good should the weather improve at an early date.—*J. G. Parker.*

WAIPUKURAU.—The climatic conditions last month were most erratic, heavy rain being the order for the greater part, with odd warm days intervening. Crops and pastures require more warm weather; feed is very soft, and stock are not doing so well as they might.—*H. O. M. Christie.*

PAHIATUA.—We had a month's rain, accompanied by cold winds, either from the north-west or south-east. The rain and cold winds had a bad effect on all outdoor work

connected with farm, station, orchard, and garden. Generally speaking, shearing operations throughout the district are being delayed. Labour appears to be scarce, as in several cases the farmers' wives are assisting their husbands in the sheds. Rainfall for month, 8.42 in. Rain fell on nineteen days, the heaviest fall being 2.50 in. on the 26th. Rainfall for November, 1911, 7.21 in.—*T. Bacon.*

NORTH WAIRARAPA.—The weather for the past month was anything but good from a farmer's point of view, being showery, with high winds. Notwithstanding this, crops are looking particularly healthy and give promise of being up to the average. Grass there is in abundance, but it is soft, consequently lambs are not fattening as they should, and the weakly ones are inclined to scour. Shearing also is very much delayed on account of the weather.—*J. S. Rankin.*

MASTERTON.—The weather was anything but seasonable during November. It is generally agreed that such exceptional meteorological conditions as those experienced throughout this district during the month have not obtained for many years. Farm-work has been seriously hampered, and shearing is now a month late on some stations. The milk-supply to factories is not nearly as good as it was a month ago; though there is plenty of grass, it is weak in character, and as a result scouring is common among lambs and young sheep. Fruit-orchards and vegetable-gardens suffered considerably from the heavy rains and wind of last month. A lot of hay is ready for cutting, and unless the weather improves the hay crops will be a failure. Several settlers are considering the advisability of converting their hay into ensilage. Small birds are playing havoc with the ripening cherries.—*T. C. Webb.*

SOUTH WAIRARAPA.—November was a wet month, with the exception of a few hot days in between. Grass is plentiful throughout the district, and good crops of hay are anticipated. Shearing has been delayed in many instances, and it is admitted that it has been one of the worst seasons in that respect for many years.—*S. C. Ivens.*

WELLINGTON.—One really fine, calm, warm day was experienced in November. With the exception of a beneficial effect on pastures, the weather was unfavourable to pastoralists and farmers. Shearing and haymaking were frequently interrupted and delayed by downpours of rain. The clip is good and well grown, but very light in grease. Lambing would reach almost 90 per cent. A profitable year is anticipated at present ruling prices. Dairymen grumble at their returns being diminished owing to frequent heavy gales and soft washy feed on the heavier lands. Orchards and market-gardens suffered much from the weather. Potatoes are somewhat scarce and high-priced, owing to the wet land preventing digging. Oats and green feed are looking well.—*G. H. Jenkinson.*

BLENHEIM.—The month was fine and summery until the last week, when good rains fell and the climatic conditions went back to winter. Snow fell on the high country on the 29th, and there was a slight frost at night. Pastures and crops generally have made great growth during the month.—*F. H. Brittain.*

NELSON.—The weather during November was too dry until the last few days, when nice rains fell. The pastures are still fairly good, though beginning to dry up on the north faces. The grain crops have gone off considerably, and the oats, on the whole, are light. The recent rains will improve the late-sown corn, and the root and green crops should now do pretty well.—*Gilbert Ward.*

WESTLAND.—November was a somewhat changeable month in regard to weather-conditions, and there were a few very cold days with heavy, showery, southerly squalls. The rainfall to date (27th) is 6.86 in., the maximum being on the 4th, when 2 in. were registered. Owing to adverse weather-conditions farmers have been hampered in getting ground in readiness for cropping—this also applies to work being carried out in regard to co-operative experiments; but, as we generally get a very late autumn on the West Coast, this makes up for the loss of time in the early part of summer. Settlers on the West Coast are taking quite an interest in the experiments now being conducted by the Department.—*H. J. Walton.*

KAIKOURA.—A lot of wet weather was experienced last month, a few of the days being quite wintry and excessively cold. Sheepowners in consequence have been seriously delayed with their shearing. Pastures and crops are looking first class, there being an abundance of feed about. The potato crops look well, and there are no complaints of blight as yet. Some large consignments of cattle have been bought up and left this district during the month for the south.—*W. S. Goodall.*

ROTHAM.—The weather during the month of November was very changeable and unfavourable for shearing operations. During the early part of the month we

had some very warm days, with heavy rain at nights, but towards the end—viz., 27th to 29th—we had real wintry weather, with snow fairly low down on the ranges, which has been very disastrous to newly shorn sheep; a good many have perished. Grain and root crops are looking remarkably well throughout the district, and there is every indication of a very early harvest. Feed is abundant and stock generally are in good condition. Farmers are in good spirits, and are looking forward to a very prosperous year. Prices offering for sheep and wool are very encouraging.—*W. M. Munro.*

RANGIORA.—There was a considerable fall of rain last month, measuring 2·51 in., and this falling on already cold and saturated ground kept down the temperature and checked the growth of all but the most vigorous plants. Two or three days were unusually hot, the remainder unseasonably cold. Sunshine for the month, 156 hours 18 minutes. The crops are looking well, but are very backward. Lambs have done well. Westerly winds of a coolness unusual at this time of the year prevailed during the month.—*A. Hughes.*

LINCOLN.—The wet and cold character of the season still continues. As a result shearing has been greatly hindered, and several severe losses of newly shorn sheep have occurred. During the month a big acreage was planted in potatoes. Cocksfoot promises well. The demand for store cattle, consequent on the great abundance of feed, cannot be satisfied. On the plains the growth of white clover in the pastures is very marked. This season the making of ensilage might be worthy of consideration. Under present weather-conditions, haymaking is not possible.—*J. G. Scott.*

ASHBURTON.—Rain fell on sixteen days of last month, a total of 1·82 in., against 2·4 in. for the corresponding month of last year. The highest reading of the thermometer was 81° Fahr. on the 25th. Feed is in abundance everywhere, and is causing sheep to scour badly. The wool is bright, but very light in condition. Autumn-sown crops of oats on the light land are in ear and there will be an early harvest, whilst on the heavy land the crops are backward and the harvest will be late. Grass-grub moths are on the wing, but are not very plentiful.—*C. Branigan.*

FAIRLIE.—Very changeable weather was experienced during the month. There is a good deal of feed, but a spell of sunny weather would improve matters very much. Lambs are scouring on the low country, and shearing is very much delayed. Good prices are being obtained for stock: good milch-cows, £10 to £12; sound-mouthed ewes with lambs, to 16s., all counted. Hill lambs for forward delivery are up to 13s. Should the weather be favourable a good deal of grass-seed (Italian rye and red clover) will be harvested.—*W. B. Manning.*

TIMARU.—The weather all through the month was very broken and unsettled—heavy gales of wind and cold rains, with a few north-west and sunny days. A spell of warm weather is badly needed to harden up the wheat crops. There is an abundance of feed all through the district. Turnip and rape sowing is general. The grass-grub is doing a certain amount of damage, mostly in newly sown grass-paddocks.—*J. C. Huddleston.*

WAIMATE.—The weather during November was, with the exception of a few fine days, unfavourable for agriculturist or pastoralist. Cold rains and winds, with snow on high country, were general throughout the district, and from this cause several of the larger runholders have delayed shearing until December. Pastures are exceedingly good, and feed is in abundance everywhere. Winter-sown wheat is not doing too well, but spring-sown wheat is generally looking better. Oats in general look well. Warmer and more seasonable weather would be much welcomed by all on the land. Lucerne made a good start, but is somewhat checked now from want of warmer weather. This plant is daily becoming more popular as a fodder-producer. A considerable area is under potatoes, and crops through the ground are coming along well and have generally a healthy appearance. Less rain and more heat would now be most beneficial to farmers.—*F. A. Macdonald.*

KUROW.—The weather during the past month was very favourable for the farmer, crops, especially on the Otiake and Otekaike Settlements looking splendid. There has been an absence of the usual drying nor'westers this spring so far, which has allowed grass and crops to get a good start, and prospects look bright for a remunerative season. Shearing is in full swing in this locality, but the cold nights experienced lately have been rather severe on shorn sheep. Stock of all kinds are in the pink of condition, and farmers and graziers on the Upper Waitaki seem to be well satisfied with their prospects.—*G. Reid.*

OAMARU.—Last month opened with rough, wet weather, clearing to fine towards the middle, when about a week or more of really good weather was experienced. Towards the latter end of the month a change for the worse took place, in the shape of cold southerly winds accompanied by showers. Rainfall, 1.45 in. On the whole the outlook in this district is an excellent one, but the farmers are anxious for a spell of fine warm weather. Root crops are not all in yet owing to rain, but a good start was made about the middle of the month.—*W. F. Flower.*

DUNEDIN.—The weather during November, although unsettled, was a decided improvement on that of October, as we have had a fair amount of warmth and sunshine as well as some heavy showers. The pastures are looking remarkably well, feed being in abundance everywhere. The oat crops are very backward, owing to the continued cold of September and October. Mangels are now being sown, as are also swedes. The grass-seed crops promise to be late this year. The potato crops are also backward.—*J. R. Renton.*

MOSGIEL.—During the month of November rain fell on thirteen days, with some very cold showers. Farm-work is very backward, and turnip-sowing will be very late throughout the district. There is abundance of feed for stock, both on the high and low country.—*H. McLeod.*

STRATH TAIERI.—The weather during November was changeable, and a warmer spell would be appreciated. Feed is in abundance everywhere, and where shearing has started sheep are coming out of the wool well. Lambing returns have been very satisfactory. Farmers are busy getting their turnips in, and where already sown they are striking well.—*W. Scott.*

MANIOTOTO.—Up to the 20th the weather was very cold; this kept back the growth of crops. Grass, however, is abundant, and at present the Maniototo could be more heavily stocked. Fine hot weather was experienced during the last week of the month.—*A. T. N. Simpson.*

CLYDE.—The weather for the month of November was all that could be desired from an agriculturist's point of view. We had nice showers and very nice warm weather, with very few high winds, which brought everything on splendidly. There is a very large supply of grass—more than has been seen for many years. The rough country is looking exceedingly well. There is every prospect of a good year for the farmer and runholder. Shearing operations are now in full swing.—*T. N. Baxter.*

LAWRENCE.—The rainfall for the month of November was 1.34 in., rain falling on fourteen days, the heaviest being 0.23 in. A great portion of the month was cold and stormy, with only a few fine sunny days. All crops are backward, and warm weather is wanted to bring them on, also for the preparation of turnip and rape ground. Shearing has begun, and the wool is light in grease. Lambing has also been satisfactory.—*R. Barron.*

OWAKA.—Up to the middle of the month the weather was cold and showery, and there was considerable delay in getting in crops of all kinds. Towards the end of the month good warm weather was experienced and much lost time was made up. Potatoes are late, and the area put in is much less than usual owing to the unfavourable weather. Turnip-sowing is now general. The early oat crops are growing well, and, given suitable weather from now onward, there should be heavy crops.—*R. McGillivray.*

TAPANUI.—The weather has moderated—more sunshine and less boisterous, stormy conditions, with the result that there was good growth during the past month. Cereals are coming away nicely, and every advantage is being taken of the improvement in the weather to prepare land for the sowing of root crops. Feed is plentiful here, and in Roxburgh and Miller's Flat districts the oldest settlers maintain it is a record season; but it is noticeable that the high country is very late, and shows no sign of growth yet.—*W. J. McCulloch.*

GORE.—During the past month the weather, with the exception of a few days, was broken and cold. Grass came on well, and feed is plentiful. Some of the grass-paddocks have been reserved for seed, and they are looking exceptionally well. In spite of the unfavourable weather, crops are coming on well, and have a fine healthy appearance. Although the past month was cold and broken, there was not so much rain as during October, and farmers made good progress with their work.—*B. Grant.*

LUMSDEN.—During the month of November the weather was more favourable for farming operations. The high winds in the early part of the month enabled many

farmers to get in crops they had previously abandoned hopes of on account of the wet state of the ground. Of late we have had somewhat misty and showery weather, with occasional warm genial days. Turnip-sowing is in full swing. All green feed is looking well, and a marked growth has been noticeable during the last fortnight. All oats sown are looking well.—*W. S. S. Cantrell.*

INVERCARGILL.—The weather improved somewhat last month; the rainfall was not high, a little over 2 in. falling in seventeen days. The month on the whole was cold for the season of the year, although we had a few bright sunny days, which pushed along the growth of pastures and crops. Feed is fairly plentiful, and at present the country is looking well.—*J. R. Whyborn.*

OTAUTAU.—The weather was much better during November, there being some fine warm days as well as the cold ones. A greater growth is noticeable throughout the district. The pastures are not so heavy as in previous years, owing, no doubt, to the cold spring. The crops are looking fairly well, though some are very late, many farmers preferring not to sow at all, but to put down in turnips and grass. Some fairly good grass-fields are noticeable. A large area of potatoes has been planted this year.—*H. F. Dencker.*

QUEENSTOWN.—The weather during last month was very changeable, a fair amount of rain falling during the first fortnight. Cold winds with sleet showers, which made it as cold as winter, prevailed off and on throughout the whole month, with a day or two of nice sunshine between. The country is looking very well and crops generally, although backward, give promise of a decent year.—*A. Clarke.*

PEMBROKE.—Following on from the previous month, the weather during November was very changeable. We had a good deal of rain, also a certain amount of heat, but not as much of the latter as might have been expected for this time of the year. Shearing is in full swing; the clip is somewhat lighter than usual, there being very little yolk in the wool. The majority of old ewes are in poor condition, and the death-rate among these has been heavy. I have heard of some good lambings. Pastures and crops have come away well, and the prospects are bright.—*J. A. Griffith.*

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows regarding orchard conditions for the month of November:—

WHANGAREI.—The weather during the first part of the month showed but slight improvement upon that of the preceding month, but the latter part was dry. Prospects of a good average crop of all fruits, with the exception of nectarines and some varieties of plums, remain good. The dry weather just experienced has somewhat retarded growth in the strawberry, and consequently the supplies are rather short at present; these should improve with good weather-conditions. Up to the present there has been but slight show of Irish blight in potatoes.—*J. W. Collard.*

AUCKLAND.—Poverty Bay weather to middle of November was mostly fine, with fairly high winds; prospects same as previous month.—*W. R. L. Williams.*

AUCKLAND NORTH.—Weather colder than usual. Present appearances promise good average crops all varieties except Japanese plums. Strawberries backward owing to cold winds. Potatoes good crop, very little blight. Tomatoes doing well. First consignments cherry-plum now on market.—*W. C. Thompson.*

AUCKLAND SOUTH.—The weather last month was very unsettled, but a slight improvement on the previous month. Potatoes and tomatoes are looking exceedingly well, being very free from Irish blight. There is a good crop of early apricots, but later varieties have not come up to expectations.—*N. R. Pierce.*

HAMILTON.—Orchards in many parts of the district are now showing the effects of the unseasonable weather experienced at the latter part of October. A frost on the night of the 10th instant rather seriously injured a number of potato crops in the Waikato. Gooseberries are quite up to expectations. Plum and peach crops are rather

light. Nectarines are looking well. The apple crop will be well up to the average.—*T. E. Rodda.*

WANGANUI.—Gooseberries (a heavy crop), strawberries (good), and cherries (fair) now being picked and meeting a good demand. Plums and peaches are developing well and promise to be a fine sample. Black-spot is giving trouble among the apples and pears in many instances, and the brown beetle is making itself a general nuisance, though causing no alarm to the grower who consistently sprays his trees. Trees generally are in good leaf and making excellent growth.—*W. C. Hyde.*

MANAWATU AND WAIRARAPA.—Very wet month, consequently orchard work much delayed. The prospects of the apple and pear crops are medium to good, while plums are not so heavy as last year. The black aphis has done considerable damage in the Wairarapa, and the bronze beetle is very bad around the Levin district. Vegetables on the whole are looking well. Tomato blight is noticeable in places, but principally where no spraying has been done.—*George Stratford.*

HASTINGS.—The weather throughout the month was more or less wet, and in consequence fungus diseases are troublesome, especially apple-mildew; otherwise the fruit crop is progressing favourably. Irish blight and onion-mildew are in evidence to a slight extent. Vegetables have made rather poor growth during the month.—*J. A. Campbell.*

WELLINGTON.—Heavy gales prevailed every week throughout last month. Apples and Japanese plums continue to show good crops; gooseberries are in good supply and realizing fair prices at the markets, and strawberries are fair to medium. Tomatoes suffered considerably through the recent heavy gales, some growers losing large numbers of plants. Present indications point to most of the stone fruits being in short supply for Christmas sales. Growers are beginning to realize the need for spraying with Bordeaux mixture, winter formula, at the proper time of the year. In orchards where this has been neglected peach-curl and black-spot are very prevalent.—*T. C. Webb.*

NELSON.—Dry weather prevailed throughout last month, but rain fell on the 25th and continued until the 29th, with snow on the mountains. Black-spot is fairly bad on both apples and pears. Silver-blight is decidedly worse this season, especially on peaches. Some growers report apples dropping badly, but I predict a good crop nevertheless. Pears have not set as well as I anticipated in my last report. Peaches and apricots are very fair, but plums are on the light side in most places. Strawberries are being shipped in fair quantities, but had the rain come sooner the output would have been much heavier.—*J. H. Thorp.*

CANTERBURY.—The weather was very boisterous, south-westerly prevailing, causing cherries to drop freely; in fact, all stone fruit has suffered to some extent. Nevertheless, on the whole a good crop is assured—apples and small fruits especially good. Peach-curl, shot-hole fungus, and pear-scab rather prevalent. Spraying operations handicapped owing to wet stormy weather.—*W. J. Courtier.*

TIMARU.—November was a showery month and favourable for the development of black-spot. Apples are light, but pears have set well, though in a great many cases are badly spotted. Leaf-curl and shot-hole fungus are much in evidence.—*A. B. Mansfield.*

DUNEDIN.—Fair quantities of strawberries and cherries being sent to market; other fruits coming on nicely, although weather still unfavourable, being cold and wet. Peach-curl and dieback much in evidence this season, especially where fungicidal spraying neglected.—*W. T. Goodwin.*

At the Wellington wool-sales on the 6th December the clip from the Romney flock of the Weraroa Experimental Farm sold as follows: Ewes, 13d.; hoggets, 12½d.; pieces, 9½d.

The New Zealand Clydesdale Horse Society has now a membership of 302. It is expected that there will be a thousand entries for the first volume of the society's stud-book.

M A R K E T C O N D I T I O N O F L O C A L F R U I T A N D V E G E T A B L E S.

THE Fruit Inspectors of the Orchards and Gardens Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these for the month of November :—

AUCKLAND.—Practically only new season's fruit is being handled now. The small quantity of last season's produce coming forward is very poor. Apples: The locally grown apples on the market are a negligible quantity, and that offering, though comparatively free from disease, is of decidedly poor quality. Gooseberries: During the month there has been a plentiful supply on the market of good sound fruit, which has realized from 7s. 6d., in the earlier part of the month, down to 4s. 6d. per case. Loquats: A few consignments of these are now coming forward. They are of fair quality and sell at about 6s. per case. Lemons: On the whole the quality of those offered for sale has been very fair, and they are carefully graded and packed, but I noticed several lines from the Avondale district very badly infected with *veruccosis*. Prices have been ranging from 10s. per case, for small and rough specimens, to 15s. per case, for medium-sized fruits. Plums: A few cases of the Evan's Early variety have come forward in excellent condition and of good flavour, for which there appears to be a keen demand. Cherry-plums are also coming in, and both are realizing an average of 5s. per case. Strawberries: There is now a supply which adequately meets the demand. Although in the beginning of the month, when the first fruit of the season was sought after, they were selling as high as 1s. 6d. per pound, they may now be bought at 7d. They are all of good appearance, sound, and attractively packed, but, doubtless owing to the wet weather experienced here, the flavour is poor. Tomatoes: Local growers are now sending in regular supplies of excellent fruit, for which there is a keen demand. Carefully graded cases of first quality are realizing as high as 1s. 3d. per pound, and the smalls and second-quality lots are ranging from 8d. to 10d. per pound. Oranges: The quality of those coming in from the north is first class, and the fruit, though on the small side, is very clean and free from disease. The ruling price is about 15s. per case, but they have been down as low as 5s. when heavy shipments from the Islands overstocked the market. Loganberries: A few small lots of those which came forward in good condition were speedily snapped up at an average price of 1s. per chip basket of about 1 lb. weight. French beans (forced): One or two small lots have been sold at from 6d. to 7d. per pound, the quality of which was very good. Peas: The demand for green peas is still well in advance of the supply, and the lowest price at which they could be purchased during the month was 1s. per peck, while the average price for the month was 1s. 3d. Potatoes: The last season's crop seems all to have been cleaned up, and only new potatoes are being handled now. These are of good quality, sound, of good size, and remarkably clean. Screened tubers have been fetching 3d. per pound, seconds 1½d. to 2d.—*C. Craigie.*

WELLINGTON.—The supply of apples to the markets is not very large, but they realize good prices and are arriving in excellent order. The market for new potatoes changes almost daily. A few days ago it was difficult to sell at £10 per ton, but lately Otaki and Hutt potatoes are bringing from 15s. per hundredweight. Values vary according to the quantity sent in from day to day. Old potatoes are about finished, and prices have advanced; sound lots are worth £12 to £13 per ton. Strawberries continue to

come forward from Auckland, Motueka, and Lower Hutt districts and are in fair demand, being worth 1s. to 1s. 3d. per box. Gooseberries are in fair supply; worth 2d. and 3d. per pound. A small supply of currants came to hand and realized satisfactory prices. Onions are lightly supplied. There are no local onions on the markets. Californian onions are worth £21 per ton. Swedes throughout were lightly supplied: consequently there was a good demand. Prices were the highest for years, realizing up to £7 to £9 per ton. A good opening is offered to any grower who cares to grow onions and swedes, as these are always in good demand. New Zealand lemons brought 13s. to 18s. per banana-case. This is considered very satisfactory, seeing that Mildura and Sydney lemons the same day brought 13s. to 20s. per case. Hothouse tomatoes are in fair supply, and the market is somewhat weaker. French beans are forward and are realizing extreme rates. Green peas have eased slightly. All other vegetables are in good demand.—*T. C. Webb.*

CHRISTCHURCH.—With the exception of cherries, gooseberries, and strawberries, there are no local fruits on the market. Tomatoes, cucumbers, and new potatoes are offering in small lots. Other vegetables are in fair supply.—*E. A. Reid.*

DUNEDIN.—Strawberries and cherries have been arriving in fair quantities, and the quality is excellent. Tomatoes and gooseberries, small supplies only, but in good condition. Vegetables: New potatoes, green peas, cabbages, carrots, rhubarb, turnips, and spring onions are all coming to hand in fair quantities and in good condition.—*E. T. Taylor.*

BLUFF.—Practically no local fruit has been on this market during the month of November. Towards the end of the month, however, there have been a few tomatoes and the first of the strawberries, but both are scarce.—*R. Hutton.*

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—Weather has been bad all spring, but as clover blossoms are plentiful the yields of honey should be a fair average crop if the weather remains good.—*G. V. Westbrooke.*

WELLINGTON.—The outlook for a good crop of honey this coming season is not very bright. The continuous boisterous weather has prevented any secretion of nectar in the flowers, thus forcing beekeepers to feed their bees on sugar-syrup until the main flow. Unless there is a spell of warm, sunny weather the crop will be a light one.—*F. A. Jacobsen.*

CHRISTCHURCH.—There is a fine show of white clover, and prospects are exceptionally good, provided there is a continuation of warm, settled weather. Strong stocks are bringing in large supplies of honey. This flush has caused a good deal of swarming, and beekeepers are adding fresh supers daily.—*L. Bowman.*

DUNEDIN.—It is rather early yet to state what the prospects of honey crop will be in my district. So far bad weather has retarded the growth of clover, but given fine weather the present season should be an improvement on last, and a fair average crop be gathered.—*E. A. Earp.*

WEATHER DURING NOVEMBER.

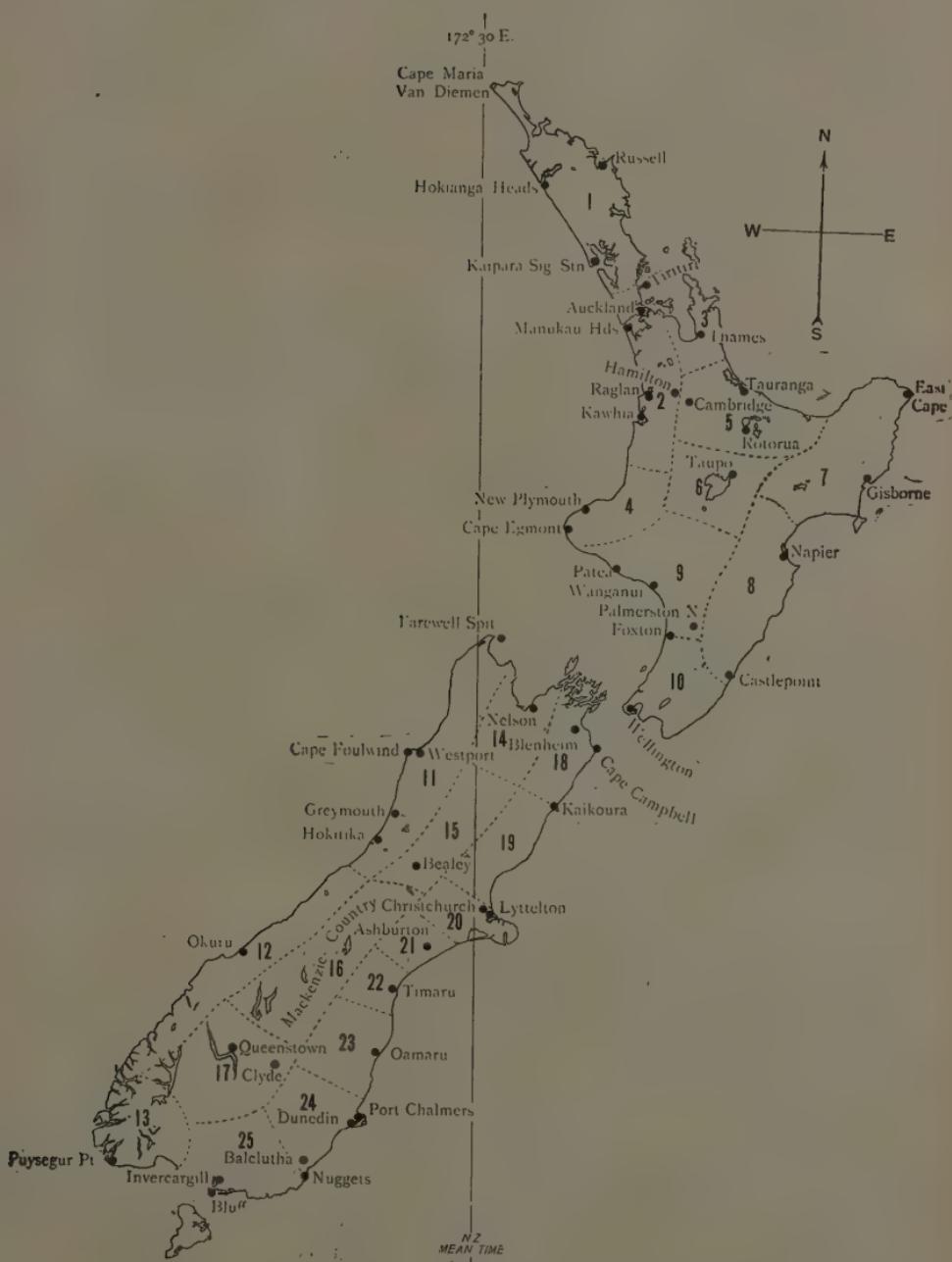
DISTRICT NOTES.

D. C. BATES.

Chiefly from Telegraphic Reports.

District.

1. 3. Mild and fair weather prevailed between the 18th and 24th, but the remainder of the month generally proved cool and showery, with a predominance of westerly winds. The total rainfall, however, was everywhere below the average for the month, the deficit varying between 20 and 60 per cent.
2. In the northern portion of this district the rainfall was slightly less than the average, but elsewhere it was somewhat in excess. The heaviest rain fell on the 20th and 26th, but showery weather was the feature of the month.
4. An excessive rainfall was recorded over this district, some stations having double the usual amount, and most of it falling on the 3rd, 25th, and 26th. At a few places, especially near the mountains, particularly heavy rain occurred on the 3rd, over 5 in. being reported in twenty-four hours. Fair weather was the exception, and the month may be characterized as a very wet one.
- 5, 6. No remarkably heavy rain fell, and the average was not attained in either of these districts. Dull weather was frequent, but was interspersed with a few fine and clear days.
7. Precipitation was slightly in excess of the average, the greater portion falling in the last week. Fair to cloudy and showery conditions prevailed during the remainder of the month.
8. Very changeable weather prevailed. The total rainfall was about the average about Napier, but above it elsewhere, and in the northern portion of the district the excess was 50 per cent.
- 9, 10. The rainfall exceeded the mean everywhere in these two districts, the average excess being about 85 per cent. Showers were frequent, and a heavy fall occurred on the 26th. Except between the 20th and 24th, when mild and fair conditions were experienced, the month was generally changeable and cool, and high winds were prevalent.
- 11, 12. The West Coast districts had about the average rainfall for November, some places recording slightly less and others slightly more. The wettest portion was the first half of the month, but no particularly heavy falls occurred, the weather being changeable and showery.
14. Between the 10th and 24th fair weather was experienced, practically no rain falling during this period. The total was about the average for the month of November.
- 15, 16. About the average precipitation was recorded. The weather generally was proved changeable and showery, and on several days slight falls of snow occurred.
17. The rainfall was slight, but reached the average at most stations. Much dull and cold weather was experienced, the finest period occurring between the 18th and 26th.
18. The weather was changeable, the first and last weeks being wet; but the middle portion of the month, although somewhat windy at times, was almost rainless in the northern part of this district. On the south and east coasts, however, more rainy days were recorded, and the excess above the average was much greater than in the north.



19, 20. Both the number of rainy days and the total fall exceeded the average, the latter by about 50 per cent. Most of the rain fell in the first half of the month, but the latter half, too, was somewhat changeable and cold.

21, 22. About 15 per cent. more than the average rain fell, mostly during the first half of the month. Electrical disturbances occurred on several days. Generally a changeable and cold month.

23. The month was lacking in sunshine, dull and showery conditions predominating. No heavy falls occurred, and the departure from normal, in some cases, appear with a negative difference.

24, 25. These districts experienced about the average rainfall, the difference not varying more than 10 per cent. one way or the other. The weather was cold, showery, and squally at times. On the 9th a severe thunderstorm occurred in parts.

SUMMARY.

During the month under review the weather was a repetition of that experienced in October. On not one occasion was the atmospheric distribution such as to favour settled conditions. The nearest approach to such was between the 19th and 23rd, when a high-pressure system was in evidence, but although fair conditions ruled at this time cloudy skies were frequent and widespread. Precipitation was considerably above the average in the Taranaki, Hawke's Bay, and Wellington districts in the North Island, and slightly above in the east coast and southern districts of the South. Auckland and Westland generally recorded under the mean monthly fall. Heavy falls of rain were experienced over wide areas on the 4th, 25th, and 26th. Generally the falls were not excessive, however, although the total number of wet days was above the average. The country was not for long free from the influence of depressions both of the westerly low and cyclonic type, although they were not at any time of great intensity.

H.B.M. Consul at Palermo, reports the High Commissioner, states that an Italian firm had obtained a concession of land in Syracuse, Sicily, with the object of establishing a cattle-depot from which to supply the Italian Government with fresh meat for the troops. The cattle are being imported from Argentina, and a beginning has already been made, the first shipment having arrived at the end of last month. The price to be paid works out at, roughly, 8d. per pound, so that quite a profitable trade would seem to be possible. It will be interesting to note whether this new departure will have any effect upon the importation of frozen meat into Italy, which has grown within recent years to fair proportions—12,000 tons, it being estimated, having entered the country in 1911.

STOCK IN QUARANTINE.

THE following stock was received into quarantine during the month of November:—

No.	Breed.	Sex.	Port of Origin.	Owner or Agent.	Address.
MOTUHI ISLAND (AUCKLAND).					
3	Holstein ..	Bulls ..	Sydney ..	George T. Nicoll ..	Auckland.
12	" ..	Heifers ..	" ..	" ..	" ..
QUAIL ISLAND (LYTTELTON).					
3	Collie dogs ..	Male ..	London ..	James Litco ..	Lochiel.
1	" ..	Female ..	" ..	" ..	" ..
3	Collie pups ..	Male ..	" ..	" ..	" ..
2	" ..	Female ..	" ..	" ..	" ..

ANSWERS TO CORRESPONDENTS.

MIXING OF FERTILIZERS.

MR. A. J. WILLIS, Woodside, Manurewa, Auckland, writes,—

I should be glad if you would inform me if there is any loss through chemical action taking place when the following manures are mixed, also if there is any other objection to these mixtures: (a) Blood manure and basic slag; (b) sulphate of potash and basic slag; (c) superphosphate and basic slag. The mixtures to be sown immediately after mixing.

The Agricultural Chemist replies,—

(a) Should not be mixed; (b) and (c) may be mixed if used immediately after mixing. A diagram showing which manures may and which may not be mixed will be found in Vol. 2 of the *Journal*, page 216.

RYE-GRASS.—PENNYROYAL.

MR. G. C. JACOBS, Rotomana, Westland, writes,—

Could you tell me through your *Journal* whether perennial Italian rye-grass is obtainable in New Zealand. Also, what is the best method of getting clear of pennyroyal? There are only small patches on the place yet.

The Fields and Experimental Farms Division replies,—

Perennialized Italian rye-grass can be obtained from the principal seedsmen throughout New Zealand. Drainage, cultivation, and the free use of lime are the best means of ridding land of pennyroyal.

SILVER-BLIGHT.

MR. W. HARRY, Te Puke, writes,—

I have a plum-tree badly infested with silver-blight. Is there any known cure, and, if so, when is the best time to apply it?

The Orchards, Gardens, and Apiaries Division replies,—

Silver-blight is a very difficult disease to deal with, but we have found the application to the soil round the fibrous roots of the trees, in the spring, of 4 lb. to 6 lb. (according to the size of the trees) of either sulphate of ammonia or sulphate of iron an effective remedy in some instances. Growers in the Stoke district have found that spraying affected trees when in foliage with a strong limewash—almost as thick, in fact, as whitewash—apparently effective. This method is also well worth trying.

FLOOD-GATE FOR DRAINS.

MR. C. A. KIDD, Akaaka, Waiuku, writes,—

You might in one of your issues inform me the best kind of flood-gate for drains, as we (the settlers) are going to flood-gate the river out this season by banking out the river along the frontage and putting a gate on to keep out the tide.

The Fields and Experimental Farms Division replies,—

It is submitted that this question could best be answered by an irrigation engineer. I should suggest that you refer the matter to the Public Works Department. The Akaaka Swamp is of considerable area, and there are many settlers in its vicinity, therefore any work of this nature that may be attempted there will partake of a public character.

FLY ATTACKING CABBAGES, ETC.

MR. J. W. HINCHEY, Kenny Street, Waihi, writes,—

Will you kindly let me have directions as to the treatment of cabbages, cauliflowers, &c., to protect them from the fly?

The Orchards, Gardens, and Apiaries Division replies,—

It is not clear from the above query whether it is the cabbage-moth or the green aphis that is referred to. The following is the treatment for cabbage-moth: Boil a pound of coal-tar in 1 gallon of water for twenty minutes, and while boiling tip into 50 gallons of fresh water; stir well for some time, allow to settle, and it is ready for use. Apply frequently with a spray-pump or garden-syringe. Spraying with arsenate of lead, 1 lb. to 50 gallons of water, will also control this pest. If the cabbages are well washed before being used there is no risk to health from using spray.

For aphis, spray with a tobacco-wash in the following proportions: 1 lb. strong tobacco or 3 lb. waste tobacco, 3 lb. soft soap, 20 gallons water. If the cabbages are young use about twice as much water as that given in above formula, if necessary gradually increasing the strength of the wash as the season advances and the growth of the plants hardens. Another good spray for the control of aphis is 1 cake of Sunlight soap boiled in 3 gallons of water, and applied with a fine spray.

HARVEY ORCHARD PLOUGH.

MESSRS. H. TURNER and C. PHILLIPS.—The Orchards, Gardens, and Apiaries Division replies as follows to your queries.—ED.

Full particulars as to price, &c., of the Harvey patent plough can be obtained from Mr. Daniel Harvey, implement-maker, White Horse Road, Box Hill, Victoria.

MENDELISM.

MR. L. T. DANIELL, Bush Grove, Masterton, writes,—

Kindly answer the following:—

1. By putting a black Polled Angus bull on purebred Shorthorn cows (a) what percentage of black, blue, and red cattle would result in the third generation, and (b) is it possible to fix a blue type?

2. Has the law of Mendel been followed in the herd of (naturally) hornless Hereford stud cattle which the United States Department of Agriculture is breeding up, and, if so, how?

3. In breeding for a particular feature—say, to eliminate the red ring round a Hereford's eye—how many generations would be necessary before you could guarantee it not to recur?

Mr. F. G. A. Stuckey, M.A., the writer of the article entitled "The Mendelian Theory of Heredity" in the September and October *Journals*, replies as follows:—

In the present state of our knowledge it is probably impossible to give definite answers to your questions. As pointed out in the October *Journal* (page 353), research is urgently needed as to the genetic behaviour of the several characters. Farmers and breeders can greatly help by carefully recording facts that come under their observation. With regard to the first query, the following facts seem to be fairly well established with regard to the inheritance of colour in cattle:—

(i.) Red is dominant to white, but the dominance is imperfect, and the union of red and white often results not in red offspring, but in red-roan. Red-roan is therefore to be regarded as a hetero-zygote of red and white. Compare the case of the Andalusian fowl.

(ii.) Black is dominant to white, but these colours often behave in the same way as red and white, the blue-roan being a hetero-zygote of blue and white.

(iii.) Black is dominant to red.

The origin of the blue-roan cattle from the cross Angus \times Shorthorn is explained by the presence of both red and white in the Shorthorn. Your question involves two definite colours, black and red, together with factors determining pigmentation or absence of pigmentation. The problem is further complicated by the fact that the white cattle are not true albinos.

Following the laws of inheritance of these colours, *so far as they are at present known*, and applying Bateson's method of Mendelian analysis, we should expect the F₂ generation to be constituted thus: Out of every 64 individuals there would be 18 black, 18 blue-roan, 9 red-roan, and the remainder would be more or less pure-white.

Question 1 (b): It has already been said that the blue-roan of cattle is a heterozygote of black and blue. It differs from the blue of such an animal as the blue mouse in that the blue of the latter is a gametic character—that is, one which can be carried by the germ-cells—while the blue-roan of cattle “depends on the collocation in one individual of one germ-cell bearing black with another which does not bear black.” It is evident to the eye that the blue-roan of cattle is “not the homogeneous blue of the blue cat or mouse, but a mixture of white or whitish hairs among black or blue ones. Still, on analogy we might have expected the blue of cattle to be capable of representation in the germ-cells, but the facts so far as I can discover afford no support to that supposition.” (Bateson.) The information at hand points to the conclusion that a blue type cannot be fixed, the inheritance of blue in cattle following the same lines as the blue in the Andalusian fowls (October *Journal*, page 350)—that is to say, by mating “blues” one might expect the offspring to be half blue, one-quarter white, and one-quarter black (that is, out of every 100 there would be 50 blue, 25 white, and 25 black).

Question 2: I have no information on this point.

Question 3: This question is too vague. You do not mention what parents you intend to use for the purpose indicated.

MR. A. F. A. WOOLLAMS, Auckland, writes,—

I would be indebted to you if you could put me on to some book covering the whole subject of Mendelism.

Mr. Stuckey replies,—

Of the books referred to on page 353 of the October *Journal*, Bateson's book deals most fully with the subject. A glance at the bibliography of the subject as given by Bateson will convince any one that there is no single book “covering the whole subject of Mendelism.”

LIMEWASH.

MR. GEO. THOMSON, Mar ia South, Murchison, writes,—

Could you, through the *Journal*, give me a recipe how to make limewash that will stand outside as well as inside?

The Live-stock and Meat Division replies,—

The “Lighthouse” wash is probably as good as anything. Take $\frac{1}{2}$ bushel unslaked lime, slake with boiling water, and cover to keep in the steam. When cool strain through a fine sieve. Add 1 peck salt dissolved in warm water (saturated); 3 lb. ground rice, boiled to a thin paste and stirred in while hot; $\frac{1}{2}$ lb. Spanish whiting; 1 lb. glue previously dissolved by soaking in cold water and then melted in a water bath. Add 5 gallons of warm water, and allow it to stand a few days before using, well covered from dust.

EFFECT OF DEPRAVED APPETITE IN CATTLE.

MR. JOHN ROBERTSON, Windermere, Winslow, writes,—

Could you tell me what causes milch-cows to eat drainpipes (made of clay). They are lying in the paddocks where the cows are. It is surprising how they bite pieces off them and chew them. I have salt in the paddock for them to lick if they like. Do milch-cows need bonedust? Would you recommend giving cows—milch-cows—crushed bones? If so, should I crush them with a grit-crusher?

The answer by the Live-stock and Meat Division to Mr. Ernest E. Preston, on page 165 of the *Journal* for August, 1911 (a copy of which has been sent you), applies in your case.—ED.

COMMERCIAL REPORTS.

IMPORTATION OF FROZEN MEAT TO GERMANY.

Under date of London, 4th October, the High Commissioner reports:—

Further to my letter of the 27th ultimo, I have now the honour to advise you that according to Press reports the Prussian Government, after full investigation, has made known its decision as to the measures to be taken to combat the rise in the prices of meat. It is stated that the new regulations provide for the importation of fresh meat from several of the adjacent countries, while live cattle and swine will be permitted to be imported from the Netherlands and Russia under certain restrictions. You will be sorry to learn that very little alteration has been made with regard to the importation of frozen meat, and the Government still insist on frozen carcases containing the internal organs. The only concessions in this direction would appear to be a slight reduction in the import duties, a lowering of the railway rates, and one or two changes in the methods of inspection. From all accounts it would appear that the Government's action does not meet with the approval of the masses of the people, who have been clamouring for the opening of the frontiers and the abolition of the restrictive regulations; while, on the other hand, the agrarian party are stated to regard the alteration with concern, and are opposed to any relief measures of the kind. On behalf of the German Government it is explained that the ameliorative measures are only to be temporary, as any enduring scarcity of meat in the Empire is out of the question, and, further, the Government do not intend to depart from their present fiscal system. Commenting on the alteration, the London *Meat Trades Journal* states, "The proposals are described as temporary measures, and will not by any means fully satisfy the wishes of the municipal and other local authorities, but at the same time they constitute a fairly bold encroachment upon agrarian privileges."

It remains to be seen whether the masses will rest content with what has been done, or whether, by renewed agitation, they will force the Government to make further concessions in the direction desired.

AUSTRALIAN REPORT ON THE POSITION.

THE meat famine in Germany presents great possibilities to Australia, and is of great interest to stockowners at present. The meat when imported into Germany, besides complying with the German inspection law, is subject to a duty of 2-18d. per English pound. Some months ago an experimental consignment of fifty carcases of Australian mutton was sent to Chemnitz, in Saxony, but the reports which appeared in the papers suggested that it did not please the palates of the population of that town, and as nothing more was heard of further shipments it was assumed that the trial had been a failure. It appears, however, that the shippers were able to dispose of the meat at 1d. per pound less than the rate prevailing for native mutton. It is stated that cold storage of adequate capacity to accommodate the quantities of frozen mutton which it is proposed to import already exists in Hamburg, Berlin, and certain other large German towns. This enterprise threatens little short of a revolution in the German meat trade, for during the whole of last year there were imported only 1,277 live sheep and 221 tons of mutton.—*Sydney Agent of New Zealand Government.*

SHIPMENTS OF PRIMARY PRODUCE FROM NEW ZEALAND TO UNITED KINGDOM.
 COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF THE CURRENT AND PRECEDING SEASONS.

Month.	Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1912 237,284	302,399	12,424	114,512	64,005	95,994	..	..	16	7,295	6,365	1,942	3,407
•	1911 175,337	287,120	13,568	90,405	46,375	127,199	..	..	..	3,399	15,234	3,302	7,094
February,	1912 208,424	273,246	13,052	101,544	62,398	106,074	607	..	..	6,881	1,615	1,056	59 carcases pork.
•	1911 242,020	450,406	24,924	66,368	46,667	70,030	23,694	200	..	4,428	1,302	2,113	590
March,	1912 324,192	518,402	20,201	64,925	49,308	70,022	..	..	..	3,832	1,352	2,644	1,369 carcases pork.
•	1911 264,297	665,822	26,657	45,912	40,668	58,362	40,376	..	..	3,620	1,583	8,982	2,408
April,	1912 213,178	355,829	7,046	38,986	38,137	31,615	4,905	2,180	..	5,134	1,958	4,458	..
•	1911 172,503	49,413	19,106	14,823	33,411	42,917	38,456	6	..	9,233	1,827	2,577	2,431 carcases pork.
May,	1912 454,506	744,287	32,691	1,441	40,535	51,833	11,157	26,569	1,500	11,963	2,826	6,287	..
•	1911 204,290	377,105	20,173	995	20,732	33,033	93,854	..	..	7,443	1,210	7,720	1,087 carcases pork.
June,	1912 170,738	287,697	24,605	558	7,712	18,138	9,160	7,622	2,039	5,646	1,168	1,213	221 carcases pork.
•	1911 214,079	448,432	15,789	..	6,323	19,568	39,422	..	..	14,128	4,763	5,525	2,434
July,	1912 291,097	371,474	29,457	684	1,255	16,567	44,324	23,216	20,573	7,463	1,856	5,892	210 carcases pork.
•	1911 206,869	260,761	14,296	..	276	14,100	29,452	..	..	10,334	6,022	1,073	175
August,	1912 207,239	157,589	10,478	559	..	10,409	42,580	38,802	19,562	3,758	523	4,219	..
•	1911 66,608	110,654	3,653	..	6,260	31,976	..	..	18,231	3,443	303	3,475	2,03 carcases pork.
September,	1912 44,657	40,759	1,174	8,723	1,204	6,871	15,742	17,363	19,933	23,059	5,604	393	7,672
•	1911 112,051	40,057	6,059	6,404	..	7,390	38,151	..	..	23,059	5,604	393	..
October,	1912 51,263	15,393	3,882	49,962	16,389	4,647	7,952	64,480	5,396	4,193	401	9,075	..
•	1911 9,417	2,043	100	49,636	11,501	2,782	..	..	32,094	4,514	754	2,982	..
November,	1912 54,175	8,286	282	140,751	57,181	33,305	3,680	40,896	13,892	9,866	1,911	5,466	..
•	1911 47,770	10,427	403	135,741	57,319	44,934	15,633	..	..	16,605	7,844	2,183	3,085
December,	1911 72,192	91,965	765	109,397	46,883	54,297	..	..	..	4,366	5,719	1,364	2,708
•	1910 82,405	157,172	13,155	182,051	67,162	59,080	..	..	..	9,716	4,524	109	5,363

HEMP AND TOW GRADING RETURNS.

NOVEMBER, 1912.

Hemp.—The total number of bales graded was 10,672, as compared with 8,666 bales for the corresponding month of last year, an increase of 2,006 bales. For the twelve months ending 30th November, 1912, the number of bales graded was 95,047, as compared with 92,586 for the previous twelve months, the increase being 2,461 bales.

Tow.—During the month 4,045 bales were dealt with, as compared with 2,228 for the corresponding month of last year, an increase of 1,817 bales. For the twelve months ending 30th November, 1912, the number of bales graded was 28,665, as against 26,917 for the previous twelve months, the increase being 1,748 bales.

HEMP AND TOW GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF NOVEMBER, 1912.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.	Common.	Rejected.	Condemned.	Total.
Auckland ..	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Napier	656	1,151	304	1	56	2,168
Foxton	140	17	..	..	..	157
Wellington	602	2,605	105	..	..	3,312
Blenheim	86	1,375	2,051	217	8	..	3,647
Picton	63	104	7	..	..	..	174
Lyttelton	83	..	131	32	..	..	246
Dunedin	56	98	..	..	..	154
Bluff	167	563	44	..	..	774
Totals	182	3,100	6,623	702	9	56	10,672
Percentages of totals	..	1.70	29.05	62.06	6.58	0.08	0.53	100

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
Auckland ..	Bales.	Bales.	Bales.	Bales.	Bales.
Napier ..	..	360	558	106	1,024
Foxton ..	..	20	..	..	20
Wellington ..	126	694	6	..	826
Blenheim ..	306	1,013	231	50	1,600
Picton ..	17	14	..	..	31
Lyttelton ..	32	44	66	..	142
Dunedin ..	..	..	..	..	..
Bluff ..	..	17	2	..	19
Totals ..	481	2,351	1,050	163	4,045

Stripper-slips.—Passed for shipment: Auckland, 31; Napier, 15; Foxton, 192; Wellington, 228; Blenheim, 8; Bluff, 77: total, 551. Condemned: Foxton, 14; Wellington, 32; Bluff, 28: total, 74.

NEW ZEALAND-VANCOUVER SUBSIDIZED STEAM SERVICES.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since July last:—

	"Marama," 5th July.	"Makura," 2nd Aug.	"Zealandia," 30th Aug.	"Marama," 27th Sept.	"Makura," 25th Oct.	"Zealandia," 22nd Nov.
Butter, boxes ..	1,600	3,987	2,717	4,428	9,777	5,945
Eggs, ..	..	..	..	8	226	..
Beef, quarters ..	..	..	..	..	..	..
Beef, boned, bags ..	..	..	..	..	..	..
Frozen sundries, packages ..	4	6	8	..	12	5
Wool, bales ..	9	21	..	..	..	6
Grass-seeds, beans, &c., sacks ..	21	430	..	..	50	177
Hides and skins, sacks, &c. ..	861	425	454	657	721	559
Onions, cases ..	..	..	3	..	..	..
Sheep-skins, bales ..	..	20	..	..	138	..
Jam, cases ..	..	..	50	..	125	100
Sundries, packages ..	110	144	90	5	21	329
Potatoes, crates ..	..	..	21	..	23	..
Kauri-gum, packages ..	..	..	72	69	46	58

NEW ZEALAND-SAN FRANCISCO SUBSIDIZED STEAM SERVICES.

THE following are the shipments of produce for San Francisco, Rarotonga, Tahiti, and transhipments for Vancouver from New Zealand since August last:—

	"Tahiti," 16th Aug.	"Moana," 12th Sept.	"Aorangi," 11th Oct.	"Tahiti," 6th Nov.	"Moana," 6th Dec.
Gum, packages	14	35	..
Seeds, sacks	80	10
Grain, &c.	82	123	194	61
Meats, cases	190	326	2	475
Onions, cases and sacks	2	3	3	2
Potatoes,	25	3	..	26
Sundries, packages	121	263	189	240
Butter, boxes	5	1,147	3,725	8,418
Apples, cases
Hemp, bales	129	386	512	393
					281

STOCK EXPORTED.

NOVEMBER, 1912.

THE following table shows the numbers and descriptions of stock exported from the Dominion:—

Port of Shipment.	Horses.			Cattle.		Sheep.			Swine.	
	To Australia.	To Pacific Islands.	To Fiji.	To Pacific Islands.	To Australia.	To Australia.	To Argentine.	To South America.	To Pacific Islands.	To Pacific Islands.
Auckland	4	..	16	..	..	..	92	6
Gisborne
Napier
Wellington	1	..	..	..	142	..	16	..	..
Lyttelton	1	..	..	..	..	..	8	..	..
Timaru
Dunedin	1	..	..	..	7	..	..	..
Bluff
Totals	3	4	..	16	..	149	..	24	92
										6

Following are particulars of the horses shipped: 1 half-draught gelding, 1 hack filly, 4 hack mares, 1 trotting gelding.

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of November, 1912, of agricultural and farm products:—

Item.	Quantity.	Value.
Bran	£
Butter
Cheese
Chaff
Fruits, fresh, all kinds ..	1,989,446 lb.	22,584
Barley
Oats
Wheat
Onions
Pollard and sharps
Potatoes
Seeds, grass and clover
Total values imported	£82,015

THE BRITISH PRODUCE MARKET.

HIGH COMMISSIONER'S CABLED REPORTS.

THE Department has received the following cablegrams from the High Commissioner for New Zealand. (NOTE.—Quotations, unless otherwise specified, are average market prices on spot.)

London, 16th November, 1912.

Mutton.—The market is steady, and prices are well maintained. There is a good demand of all descriptions of New Zealand. Canterbury 4½d. per lb., North Island 4½d.

Lamb.—The market is firm and has a better tone this week. Canterbury 5½d. per lb., other than Canterbury 5½d.

Beef.—The market is quiet, but rather steadier. New Zealand hinds 3½d. per lb., foors 2½d.

Butter.—The market is quiet, with a tendency in favour of buyers. Buyers are holding back, expecting prices to go lower. The s.s. "Turakina" shipment of butter arrived in good condition, realizing 116s. to 120s. per cwt., Australian 113s., Argentine 113s., Danish 128s., Siberian 109s.

Cheese.—The market is quiet but steady. The s.s. "Turakina" shipment of cheese arrived in good condition, realizing 61s. to 63s. per cwt.

Hemp.—The market is quieter. Buyers are cautious on account of the high prices. Spot : New Zealand good-fair grade £34 per ton, fair grade £32 10s., fair current Manila £35. Forward shipment New Zealand good-fair grade £34 5s., fair grade £33, fair current Manila £35. The output from Manila for the week was 20,000 bales.

Cocksfoot-seed.—There is a better demand. Quotations are nominal.

Wheat.—The market is dull, with very little business doing. New Zealand long-berried, ex granary, 20s. per quarter of 496 lb., short-berried 38s. 6d.

Oats.—The market is quiet, but a moderate business is doing. New Zealand short sparrowbills, ex granary, 26s. per quarter of 384 lb.

Beans.—There is more demand; stock is small. New Zealand beans, f.a.q., new crop, 38s 6d. per 504 lb.

Peas.—The market is weak and inactive. New Zealand peas, partridge, 39s. 6d. per 504 lb.

Wool.—The market is firm, with more inquiry. Current quotations for Bradford tops : 36's, low crossbreds, 1s. 2½d. per lb.; 40's, low crossbreds, 1s. 3d.; 44's, medium crossbreds, 1s. 4d.; 50's, half-breds, 1s. 7½d.; 56's, quarter-breds, 1s. 10d.; 60's, merinos, 2s. 3d.

London, 23rd November, 1912.

Mutton.—The market is steady, with a very good demand for best quality. A great number of stale carcases of mutton are being placed on the market. No change in prices—viz., Canterbury 4½d. per lb., North Island 4½d. There is no prospect of an advance on account of fresh River Plate selling at 4d. to 4½d.

Lamb.—There has been no alteration in the market since last week, and there is a limited demand. Some very good quality amongst the new arrivals of Australian. Canterbury 5½d. per lb., other than Canterbury 5½d.

Beef.—There are signs of improvement in the market; a moderate supply of chilled. New Zealand hinds 3½d. per lb., foors 2½d.

Butter.—The market is very depressed. Buyers are holding back. The average price for the week for choicest New Zealand is 114s. to 116s. per cwt., Australian 111s., Argentine 109s., Danish 129s., Siberian 127s. The shipment of butter and cheese arrived in good condition, ex the s.s. "Corinthic."

Cheese.—The market is dull; there is less demand. The average price for the week for finest New Zealand is 60s. to 61s. per cwt.

Hemp.—The market is depressed on account of advices from Manila; heavy receipts and speculative operations. New Zealand good-fair grade £32 to £32 10s. per ton, fair grade £30 10s., for all positions. Fair current Manila spot £32, forward shipment £33. The output from Manila for the week was 38,000 bales.

Wool.—The market is stronger. Current quotations for Bradford tops : 36's, low crossbreds, 1s. 3d. per lb.; 40's, low crossbreds, 1s. 3½d.; 44's, medium crossbreds, 1s. 4½d.; 50's, half-breds, 1s. 8d.; 56's, quarter-breds, 1s. 11d.; 60's, merinos, 2s. 3½d.

Kauri-gum.—The market is quiet, with no alterations in prices. Nothing offered at Thursday's sale. Stock 30th October, 298 tons.

London, 30th November, 1912.

Mutton.—The market is firm. Canterbury 4½d. per lb., North Island 4½d.

Lamb.—The market is firm. Canterbury 5½d. per lb., other than Canterbury 5½d.

Beef.—The market is steady, with an improved demand. New Zealand hinds 3½d. per lb., fore 3d.

Butter.—The market is very unsettled and speculative. There is a better demand for best quality, but there is little demand for second-class quality. Choicest New Zealand 115s. to 118s. per cwt., ordinary quality New Zealand 110s. to 114s., Australian 110s., Argentine 109s., Danish 129s., Siberian 107s.

Cheese.—The market is steady, and a fair business doing at lower prices. White 59s. 6d. per cwt., coloured 60s. 6d.

Hemp.—The market is steady, with an improved demand. New Zealand good-fair grade £33 per ton, fair grade £31 10s., fair current Manila £33 for any positions. The output from Manila for the week was 21,000 bales.

Wool.—The market is strong.

London, 7th December, 1912.

Mutton.—The market is firm, with a hardening tendency. High prices are restricting business. Moderate supplies coming forward. Canterbury 4½d. per lb., North Island 4½d.

Lamb.—The market is steady, and holders are firm. Canterbury 5½d. per lb., other than Canterbury 5½d.

Beef.—There is a better demand. New Zealand hinds 3½d. per lb., fore 3½d.

Butter.—The market has advanced. It is difficult to decide the cause, but opinion is that traders consider it advisable to secure sure supply of first-class quality for Christmas trade; also belief becoming more general that colonial choicest will be in small supply. Choicest New Zealand 118s. to 122s. per cwt., ordinary quality 112s. to 116s., Australian 114s., Argentine 112s., Danish 129s., Siberian 108s.

Cheese.—The market is steady, with a better demand. Lower prices are encouraging business. The average price for the week for finest New Zealand cheese is, white 60s. 6d., coloured 61s. 6d. per cwt.

Hemp.—The market is quiet but steady. New Zealand good-fair grade £33 per ton, fair grade £31 10s., for any positions. Fair current Manila £32; forward shipment £34. The output from Manila for the week was 18,000 bales.

Wheat.—The market is dull on account of heavy arrivals. New Zealand long-berried, ex granary, 38s. per quarter of 496 lb., short-berried 37s.

Oats.—The market is quiet but steady. A large supply. New Zealand short (sparrowbills), ex granary, 25s. per quarter of 384 lb., Danish 23s. per quarter of 320 lb.

Beans.—The market is firm, with more inquiry. New Zealand f.a.q. (new crop) 39s. 6d. per 504 lb.

Peas.—The market is weak and inactive. New Zealand (partridge) 38s. 6d. per 504 lb.

Mutton and Lamb.—River Plate shipments received during November, 1912:—

		Mutton.	Lamb.
		Carcases.	Carcases.
London	..	..	135,622
Liverpool	..	..	74,363
Cardiff	..	..	8,272
Hull	..	..	10,000
Southampton	..	..	20,143
Newcastle	..	..	5,000
		253,400	46,391

LONDON WOOL-MARKET.

FIFTH SERIES OF COLONIAL WOOL-SALES.

London, 26th November, 1912.

The wool-sales have commenced. There is great competition. The market has advanced 1d. per lb. average for all grades. The market looks very strong; there are a number of buyers at the higher price. Trade is good. The demand is greater than the supply. Present prospects indicate a continuance of high prices for some time. 18,500 bales of New Zealand wools are catalogued.

London, 7th December, 1912.

The market closed very strong. There is good competition. Indications are favourable for a continuance of the present prices. 500 bales New Zealand wools are held over. Estimated value: Superior merino, 1s. 1d. to 1s. 3½d. per lb.; medium, 11d. to 1s. 1d.; inferior, 9d. to 10½d.; fine crossbreds, 1s. 1d. to 1s. 3½d.; medium, 11d. to 1s. 1½d.; coarse, 9½d. to 1s. 1d.

JOURNAL
OF
DEPARTMENT OF AGRICULTURE.

VOLUME V.

GENERAL INDEX.

A.

Abaca industry of Manila, 643.
Abortion (contagious), 194.
Milk from aborted cow, 198.
Agricultural—
Associations, 234.
Class at Waitaki Boys' High School, 38.
Colleges and experiment stations, benefit from, 213.
Education, 230.
Experiment stations in Uruguay, 112.
Instruction in France, 106.
Agriculture—
Antiquity of, 596.
British, 445.
Ailments of live-stock (see Diseases).
Akeake (*Olearia traversii*), 459.
American—
Seed-merchants, 197.
(West) markets, shipments to, 95, 191, 344, 466, 574, 691.
Ammonia, sulphate of, for potatoes, 560.
Analysis of soils, 219.
Angora goats, 333.
Animal diseases, pests, &c. (see Diseases).
Answers to correspondents, 89, 192, 332, 455, 560, 685.
Antiquity of agriculture, 596.
Aphis (woolly), 199.
Apiculture—
Adulterated honey, 649.
Arranging hives, 154.
Baldridge treatment of foul-brood, 338.
Clover honey, 645.
Drugs, 520.
Extracting, 646.
Foul-brood in United States, 84.
Foundation-imbedding, 51.
Honey-crop prospects, 681.
Introduction of Italian stock, 520.
Locating an apiary, 153.
Making hives, 49.

Apiculture—continued.
Marketing, 647.
Mating-boxes, 50.
Monthly notes, 49, 151, 265, 403, 519, 645.
Necessity for queen-rearing, 265.
Queen-excluders, 521.
Queen-rearing : Swarthmore and Alley systems, 265.
Record system for hives, 519.
Ripened honey, 647.
Shelter, 153.
Shifting of hives, 199.
Source from which honey obtained, 562.
Stimulative feeding, 152.
Swarming, control of, 404.
Wax-extracting, 647.
Apple—
Export of, Nelson shipment, 84.
Root-fungus, 333.
Tree-canker, 334.
Tree-spraying, 199.
Trees, 198.
Apples—
Benefit of care in grading and packing, 186.
(New Zealand) in Vancouver market, 189.
Appreciation, 38, 402.
Argentine trade with Britain, 96, 203, 343.
Artichoke—
As food for pigs, 340.
(Jerusalem), helianthi compared with, 19.
Artificial—
Incubation, 419.
Milk, 640.
Asparagus, 60, 160, 276, 524.
Australian—
Bacon trade, 86.
Meat trade, 87.
Shipments to Canada, &c., 190, 343.

Ayrshire—

Cattle, 631.
Herd at Moumahaki, returns, 1911-12 season, 395.
Milk-record, 144.

B.**Bacon—**

Mouldy, prevention of, 332.
Australian trade, 86.

Bacteria—

Inoculated soil, 238, 247, 336, 337, 460, 561.

Nitrogen-fixing, 627.

Baldridge treatment of foul-brood in bees, 338.

Banana-fibre, 644.

Barking of apple-trees by hares, 91.

Barley—

And vetches at Moumahaki, 614.

Experiments, North Island, 286.

Manure for, and treatment of, 193.

Basic slag—

And superphosphate, 332, 381.

As an insecticide, 217, 568.

Its application, 25.

Basic superphosphate, 195, 564.

Beans—

French, 276, 408, 527.

Lima, 197.

Manure for, 197.

Runner, 276, 408.

Soya, 197.

Bee-culture (see Agriculture).

Beef (boneless), 639.

Beet—

Red, 408.

Silver: Experiments at Belfast, 235.

Silver: Feeding - value and cultivation, 338, 456.

Bidabid, eradication of, 339.

Binder-twine, demand for, 642.

Bisulphide of carbon for rabbit-destruction, 193, 234, 604.

Bitter-pit, 139.

Blackberry-bud moth, 372.

Black-wattle (*Acacia decurrens*), 199, 458, 459.

Blood—

Manure for root crops, 460.

Poisoning in sheep, 400.

Blue-gum, 561.

Bone-char, 195.

Bonedust for root crops, 460.

Boneless beef, 639.

Books on sheep, 192.

Borer in gooseberry-bushes, 568.

Boxes, raising plants in, 276.

Brazil as market for meat, &c., 463.

Breeding, plant, 138.

British—

Agriculture, 445.

Dairy-produce imports, 88.

Hop-market, 507.

Market reports, 97, 205, 345, 469, 577, 693.

Broccoli—

Cultivation of, 405, 526, 657.

Purple sprouting, 663.

Seed, 274.

Brooder (poultry), cool, 172, 536.

Brussels sprouts, 275, 526, 657.

Buckwheat, 457.

Buda-kale experiments—

At Belfast, 236.

In North Auckland, 290.

Bulls, Holstein yearlings from Weraroa, for sale, 255.

Bush sickness, 118, 121, 471, 614.

Butter—

Canadian imports, 88.

Hard, 564.

Mouldy, 506.

Preservatives : Hawaiian regulations, 188.

Preserving, 562.

Queries, 192.

Siberian export and industry, 87, 504.

Vancouver market, 85, 189.

Venezuela, market in, 444.

C.**Cabbage—**

Cultivation, 162, 526, 656.

Moth and aphis, 686.

Trials, 74.

Californian-thistle ensilage, 357, 600.

Call of the land, 445.

Calves—

Dehorning of, 232.

Distended, 560.

Scour in, 569.

Canadian—

Dairy-produce, 454.

Exports to New Zealand, 468.

(West) markets, Australian shipments to, 190.

(West) markets, New Zealand shipments to, 95, 191, 344, 466, 574, 691.

Cape gooseberry, 409.

Carbon-bisulphide for rabbit-destruction, 193, 234, 604.

Care and treatment of milk, 491.

Carnations, 569.

Carrots—

As stock-food, 565.

Co-operative experiments with, North Island, 292.

Cultivation of, 162, 528.

Motuihi Island (Auckland) experience, 259.

Casein industry—

Position in Europe, 148.

Report by Mr. J. Pedersen on his visit to Europe, 257.

Cattle—

Ayrshire, 631.

Depraved appetite in, 687.

Importations into Italy, 684.

Red-water in, 249.

Tuberculosis in, 90.

Cauliflower, cultivation of, 58, 162, 275, 526.
 Celery, cultivation of, 59, 273, 527.
 Chemical analyses of soils, 219.
 Chemistry of bush sickness, 121.
 "Chermes" attacking *Pinus insignis*, 564.
 Chicory in grass-mixture, 89.
 China as a market, 87.
 Chou moellier—
 Cultivation, and manure, 98, 456.
 Experiments at Belfast, 237.
 Where seed obtainable, 196.
 Clover—
 Crimson, 490.
 (Red) seed, dodder in, 400.
 (White) seed, 134.
 Club-root-resistant swede, 486.
 Cockchafer, small green, 579.
 Cocksfoot-seed testing, 478.
 Commercial reports, 85, 187, 461, 688.
 Contagious abortion, 194.
 Contagious mammitis: Examination of suspected milk, 593.
 Cool poultry-brooder, 172, 536.
 Cool-storage of fruit: Plans and specifications of store, 508.
 Co-operative dairies in Hungary, 248.
 Co-operative experiments (see Experiments).
 Co-operative societies in Germany, 32.
 "Corn stover," 336.
 Correspondents, answers to, 89, 192, 332, 455, 560, 685.
 Cost of living in France, 47.
 Cow—
 Calving trouble, 560.
 Choking, treatment of, 570.
 Dairy: Feeding and management, 588.
 Dehorning of, 232.
 Douche for vaginal passage, 567.
 Good, signs of, 498.
 "Lady Ida" at Ruakura, butter-fat return, 507.
 Trouble, 566.
 Cow-shed, race, and yards, plans of, 145, 260.
 Cow-testing—
 Expansion of the movement, 143.
 Gleanings from last season's work, 500.
 Movement in Scotland, 15.
 Official register of merit: Testing pedigree dairy stock, 254.
 Paper by Mr. W. Burgess, Warea, Taranaki, 1.
 Progress in Ireland, 259.
 Saleyard experience, 14.
 Samples of milk for testing, 196.
 Semi-official testing, 39.
 Statement by chairman of directors, Stratford Co-operative Dairy Company, 149.
 Crested dogstail, 16.
 Crimson clover at Ruakura, 490.
 Crop reports, 75, 178, 323, 446, 549, 673.
 Crop (fruit), reports, 80, 183, 328, 451, 555, 678.
 Crown-gall, 156.
 Cucumbers, cultivation of, 61, 528, 658.
 Culling the dairy herd, 14.
 Cultivation—
 Of the orchard, 56, 496.
 Of the soil, 29.
 Of the vine under glass, 375, 607, 655.
 Currants, growing of, 164, 409, 531.

D.

Dairying industry—
 Artificial milk, 640.
 Ayrshire cattle, 631.
 British dairy-produce imports, 88.
 Butter export from Siberia, 87.
 Butter industry in Siberia, 504.
 Butter queries, 192.
 Canadian imports of butter, 88.
 Care and treatment of milk, 491.
 Casein industry in Europe: Report by Mr. J. Pedersen, 148, 257.
 Contagious mammitis: Examination of suspected milk, 593.
 Cow-testing (see under "C").
 Dairy-cow feeding and management, 588.
 Dairying in Europe, 387.
 Dairy-produce of season 1912-13, 638.
 Dehorning, 232, 564.
 Denmark, dairying in, 387.
 Department's herds, average returns of, 1911-12 season, 395.
 Department's Holstein importations, 392.
 Douche for cow's vaginal passage, 567.
 Europe, dairying in, 387.
 Food and milk-production, 42.
 Hard butter, 564.
 Household milk, 495.
 Machine for destroying froth, 141.
 Milk from aborted cow, 198.
 Milk-record Ayrshires, 144.
 Milk-record Holsteins, 635.
 Milk-sugar, 618.
 Milk-testing in Scotland, 83.
 Milk-testing in Sweden, 84.
 Molasses, addition of, to ration of dairy cattle, 195.
 New Zealand butter on Vancouver market, 189.
 Plans of milking-shed, race, and yards, 145, 260.
 Preservatives in butter: Hawaiian regulations, 188.
 Preserving butter, 562.
 Returns from cows at Ruakura, 554.
 Sale of Weraroa Holstein yearling bulls, 255, 498.
 Sending samples of milk to laboratory for testing, 567.
 Siberia, dairying in, 390.
 Signs of good cow, 498.
 Testing pedigree dairy stock, 254

Dairying industry—*continued.*

Vancouver market, 85.
 Wrapping-paper and mouldy butter, 506.
 Damage to sheep-skins through careless shearing, 615.
 Dehorning of cattle, 232, 564.
 Demonstrations in pruning and spraying, 272.
 Denmark, dairying in, 387.
 Department's dairy herds: Average returns of 1911-12 season, 395.
 Department's Holstein importations, 392.
 Depraved appetite in cattle, 687.
 Diary for farmers, 338.
 Diseases, ailments, and pests of live-stock—
 Blockage in cow's teat, 566.
 Blood-poisoning in sheep, 400.
 Bush sickness, 118, 121, 471, 614.
 Calves distended, 560.
 Calving trouble, 560.
 Choking cow, 570.
 Chronic nasal catarrh in foals, 106.
 Contagious abortion, 194.
 Contagious mammitis, examination of milk for, 593.
 Effect of depraved appetite in cattle, 687.
 Ergotism in cattle, 99.
 Foot-and-mouth disease, 106.
 Foot-rot in goats, 335.
 Lampas in horses, 334.
 Lice in horses, 459.
 Nutritive disorders of live-stock, 471.
 Poultry trouble, 563.
 Red-water in cattle, 249.
 Scour in calves, 569.
 "Seedy-toe" in horses, 459.
 Septic metritis, 149.
 Still-born lambs, 564.
 Testing milk for mammitis, 567.
 Tuberculosis in cattle, 90.
 Vermin affecting poultry, 67.
 Yellow scour in turkeys, 563.
 Diseases and pests of plants—
 Anthracnose of grape-vine, 272.
 Apple and pear scab, 522, 650.
 Apple root-fungus, 333.
 Apple-tree canker, 334.
 Basic slag as insecticide, 568.
 Bitter-pit, 139, 415.
 Blackberry-bud moth, 372.
 Black-spot and mildew of grape, 414, 415, 523.
 Borer in gooseberry-bushes, 568.
 Cabbage-moth and aphis, 686.
 Canker of apple-trees, 334.
 "Chermes" attacking *Pinus insignis*, 564.
 Cherry leaf-scorch, 413, 523.
 Club-root, 486.
 Codlin-moth, leaf-roller caterpillar, and bronze beetle, 271, 412, 522, 650.
 Ergot in rye-grass seed, 140.
 Fungus diseases, 270.
 Gooseberry leaf-spot, 413, 523.

Diseases and pests of plants—*continued.*

Grass-grub, 507.
 Leech, 413, 522, 652.
 Peach-aphis, 413, 523.
 Peach-curl, 562.
 Potato-blight, 198.
 Red spider affecting peach, 652.
 Rhizoctonia of mangels, 111.
 Root-fungus, 55, 333.
 Root-knot, crown-gall, hairy-root, 156.
 Silver-blight, 685.
 Slugs, snails, &c., control of, 567.
 Woolly aphis, 199, 272.
 Disorders (nutritive) of live-stock, 471.
 Dodder in red-clover seed, 400.
 Dogstail (crested), 16.
 Douche for cow's vaginal passage, 567..
 Drainage by explosives on Pakihi soils of Westland, 126.
 Drains, flood-gate for, 685.
 Dressing (machine) of seed grain, 230.
 Dry farming, 624.
 Duck eggs (soft), 335.

E.

Eggs—
 Export of, 417.
 Soft, 335.
 Trial shipment to Vancouver, 671.
 Washing of, 569.
 Ensilage—
 Feeding, 89.
 From Californian thistle, 600.
 Lessons of practical experience, 354.
 Maize for, 560.
 Pit, 337.
 Stack, 385.
 Eradication of weeds on garden path, 563.
 Ergot—
 Ingestion by cattle, 99.
 In rye-grass seed, 140.
 Espalier system of fruit-culture, 565.]
 Europe—
 Dairying in, 387.
 Poultry-rearing in, 670.
 Exodus (rural) in France, 106.
 Experiments (co-operative)—
 Analyses of manures used in South Island experiments, 443.
 Conditions under which conducted, 248.
 Experiments on refractory soils at Onekaka, 71, 116.
 Grassing experiments at Poerua and Moana, Westland, 174.
 Lucerne experiments, Manawatu, Wairarapa, Taranaki, and Hawke's Bay districts, 68.
 Maize, silver-beet, lucerne, oat, barley, wheat, pasture, kale, carrot, rape, bean, and pea experiments, North Island, 284.
 Mangel manurial and variety tests, Kai-koura, Rangiora, Lincoln, Timaru, Waimate, Kurow, Oamaru, Palmerston South, Balclutha, and Sutton districts, 442.

Experiments (co-operative)—*continued.*
 Oat experiments, Masterton, Havelock North, Runciman, Kimbolton, and Pahautanui districts, 176.
 Oat manurial and variety tests, Timaru, Geraldine, Oamaru, Palmerston South, Lawrence, and Balclutha districts, 305, 423.
 Pea and cabbage trials at Patea, 74.
 Plots at district high schools, 374.
 Potato manurial, variety, and spraying tests, Kaikoura, Rangiora, Waimate, Kurow, and Oamaru districts, 311.
 Silver-beet, Buda-kale, swede, chou moellier, and kohlrabi experiments at Belfast, 235.
 Soil-inoculation at Mārton, 238.
 Supply of lucerne-seed, lime, and inoculated soil by Department for testing purposes, 247.
 Swede turnip variety and manurial tests, West Coast, Rangiora, Timaru, Fairlie, Kurow, Waimate, Oamaru, and Palmerston South districts, 538.
 Wheat variety and manurial tests, Lincoln, Ashburton, Timaru, Waimate, Oamaru, Balclutha, Lawrence, and Tapanui districts, 299, 422.
Experiments—
 Grasses and forage crops at Lichfield, 22.
 Swedes at Ruakura, 33.
 Turnip cultivation at Weraroa, 114.
Explosives, drainage by, 126.
Export—
 Of apples from Nelson, 84.
 Of eggs, 417.
 Of grain and seed to Australia, 461.
Exports—
 From Argentina to United Kingdom, 96, 203, 343.
 From New Zealand to Canada, 468.
 From New Zealand to United Kingdom, 92, 200, 341, 464, 572, 689.
 Of stock, 94, 202, 342, 467, 576, 692.
 To Vancouver and San Francisco, 95, 191, 344, 466, 574, 691.
 Extracting phormium-fibre, 264.
Extraneous seeds—
 In rye-grass, 245.
 In white clover, 134.

F.

Farm diary, 338.
 Farm-garden, the, 58, 160, 273, 405, 524, 656.
 Feeding off wheat, 340.
 Feed-trough, 256.
 Fertilizers (see Manures).
 Field-pea, 192.
 Fiorin, 565.
 Flood-gate for drains, 685.
 Flower-garden, the, 62, 165, 277, 409, 528, 660.

Fodder crops, 33, 68, 91, 108, 114, 192, 194, 196, 198, 214, 247, 284, 332, 354, 385, 424, 455, 456, 487, 499, 538, 565, 597, 600, 614, 664.
Food—
 And milk-production, 42.
 For pigs, 194.
Foot-and-mouth disease, 106.
Foot-rot in goats, 335.
Forage—
 Crops, 19, 33, 114, 235, 284, 338, 456, 484, 538.
 Experiments at Patea, 298.
Foul-brood in bees, Baldridge treatment of, 338.
Foxglove, eradication of, 91, 566.
France—
 Cost of living in, 47.
 Rural exodus in, 106.
French—
 Beans, cultivation of, 527, 658.
 Position as to importation of frozen meat, 188.
Froth, machine for destroying, 141.
Frozen meat (see Meat).
Fruit-growing—
 Anthracnose of grape-vine, 272.
 Apple and pear scab, 522, 650.
 Apple root-fungus, 333.
 Apple-tree canker, 334.
 Apple-trees recommended, 198.
 Basic slag as insecticide, 568.
 Benefit of care in grading and packing apples, 186.
 Bitter-pit, 139, 415.
 Black-spot and mildew of grape, 414, 415, 523.
 Borer in gooseberry-bushes, 568.
 Canker of apple-trees, 334.
 Cherry leaf-scorch, 413, 523.
 Codlin-moth, leaf-roller caterpillar, and bronze beetle, 271, 412, 522, 650.
 Crop reports, 80, 183, 328, 451, 555, 678.
 Cultivation, 53, 56, 496.
 Currants, 409.
 Demonstrations in pruning and spraying, 272.
 Effect of grass on trees, 56.
 Emulsified spraying-oil, 460.
 Espalier system, 565.
 Export of apples from Nelson, 84.
 Fruit by post, 653.
 Fruit-culture at Tauranga, 565.
 Fruit-marketing, 21.
 Fruit-packing, 251.
 Fungus diseases, 270.
 Gooseberry, cultivation of, 408.
 Gooseberry leaf-spot, 413, 523.
 Harvey orchard-plough, 496, 686.
 Leech, 413, 522, 652.
 Loganberry cultivation of, 531.
 Manure for fruit-trees, 197.
 Market condition of local fruit and vegetables, 680.
 Monthly notes, 52, 270, 412, 522, 650.
 Peach-aphis, 413, 523.

Fruit-growing—continued.

- Peach-curl, 562.
- Plans and specifications of cool-store, 508.
- Raspberries, cultivation of, 409.
- Red-spider affecting peach, 652.
- Root-fungus, 55, 333.
- Root-knot, crown-gall, hairy-root, 156.
- Seaweed as blight-preventive, 414.
- Silver-blight, 685.
- Spraying, 55, 199, 270, 412.
- Strawberries, cultivation of, 272, 531.
- Thinning fruit, 414.
- Treatment of young trees, 52.
- Vancouver market for fruit, 86, 511.
- Vine-culture under glass, 375, 607, 655.
- Woolly aphis, 199, 272.
- Fumigation of rabbit-burrows, 193, 234, 604.

G.**Garden—**

- The farm flower, 62, 165, 277, 409, 528, 660.
- The farm vegetable, 58, 160, 273, 405, 524, 656.

Germany—

- Combating prejudice against frozen meat in, 188.
- Co-operative societies in, 32.
- Importation of frozen meat into, 688.
- Plant-breeding movement in, 138.

Germination—

- Of rye-grass seed, 228, 242.
- Tests of seeds, 478.

Goat—

- Angora, 333.
- Foot-rot, 335.

Gooseberry—

- Borer in, 568.
- Cultivation of, 164, 408, 531, 659.
- Gourd family of vegetables, 407.
- Grading returns of hemp and tow, 93, 201, 465, 573, 690.

Grain—

- And seed export to Australia, 461.
- Crops of the world, 63.
- Machine-dressing of, 230.

Grape-vine cultivation under glass, 375, 607, 655.**Grass—**

- Basic slag as a dressing, 26.
- Crested dogstail, 16.
- Experiments at Lichfield, 22.
- Experiments in Taranaki, 288.
- Fiorin, 565.
- Grub, 370, 507, 579.
- Mixture, 561.
- Paspalum dilatatum, 568.
- Perennial rye-grass seed, 242, 685.
- Plots at Ruakura, 216.
- Seed, 338.
- Testing rye-grass, 228.
- Western Wolts grass, 484.
- Withering on light soil, 90.
- Grassing experiments at Poerua and Moana, Westland, 174.

Green-manuring, 444.

- Grub (grass), 370, 507, 579.
- Guano for root crops, 460.
- Gypsum, fertilizer for peas and fruit-trees, 197.

H.

- Hairy-root in fruit-trees, 156.
- Hares barking apple-trees, 91.
- Harvey orchard-plough, 496, 686.

Hay—

- Lucerne, 91.
- Making, 455.
- Salting stack, 563.
- Thatching stack, 454.

Helianthi, 19, 458, 562.**Hemp—**

- Extracting, 264.
- Grading returns, 93, 201, 465, 573, 690.
- Industry: Monthly notes, 48, 150, 263, 401, 516, 641.

Herbs, garden, 163.

- Herds of Department, average returns of, 1911-12 season, 395.

Herd-testing (see Cow-testing).

- Heredity, Mendelian theory of, 207, 347.
- High Commissioner's market reports, 97, 205, 345, 469, 577, 693.

Hives (bee), shifting of, 199.**Holstein-Friesian cattle—**

- Association of America, home for, 29.
- Herd at Weraroa: Returns, 1911-12 season, 395.

Importations by Department, 392.**Milk-record, 635.**

- Yearling bulls from Weraroa, sale of, 255, 498.

Honey—

- Crop prospects, 681.
- Shipment from New Zealand to London, 269.

Hops—

- British market for, 507.
- (New Zealand), London market prospects for, 461.

Horses—

- Regulations governing introduction into Great Britain, 188.
- "Seedy-toe" and lice in, 459.

I.**Importation—**

- Of fertilizers, 44, 382.
- Of frozen meat into Germany, 688.
- Of Holstein cattle by Department, 392.

- Imports of produce, 94, 203, 343, 467, 576, 692.

Impurities—

- In grass-seed, 245, 478.
- In white-clover seed, 134.
- Incubation, artificial, 419.
- Incubated soil (bacteria)—
- Supplied by Department for testing, 247, 561.
- Use of, in growing lucerne, 460.

Inoculation (bacteria) of the soil, 238, 336, 337, 627.
 Insecticide, basic slag as, 217.
 Italy, importation of cattle into, 684.

J.

Jersey herd at Ruakura: Returns, 1911-12 season, 395.
 Jerusalem artichoke, helianthi compared with, 19.

K.

Kale—
 Buda: Experiments at Belfast, 236.
 Experiments in North Auckland, 290.
 Knot, root, affecting fruit-trees, 156.
 Kohl-rabi at Belfast, 237.

L.

Lambing—
 At Moumahaki, 616.
 From Ruakura, 554.
 Percentage, 1912-13 season, 575.
 Still-born, 564.
 Lampas in horses, 334.
 Land, call of the, 445.
 Leek, cultivation of, 162, 274, 657.
 Leguminous crops, inoculated soil from, 238.
 Lemon-trees, 567.
 Lettuce, cultivation of, 275, 527, 658.
 Lice in horses, 459.
 Lichfield experiments, 22.
 Lima beans, 197.
 Lime, 90, 340, 564, 567.
 Lime-constituent of milk, 15.
 Limewash, 687.
 Liquid manure, 561.
 Live-stock—

Diseases, pests, &c. (see Diseases).
 Nutritive disorders of, 471.
 Loganberry, cultivation of, 165, 531, 659.
 London, improved cold-storage facilities for frozen meat in, 187.
 Lucerne—
 At Ruakura, 499.
 Cultivation of, 214, 332, 455, 460.
 Demonstrations at Moumahaki, Waerenga, and Ruakura, 385.
 Experiments at Missouri Agricultural Experiment Station, U.S.A., 664.
 Experiments, North Island, 285.
 Hay, 91.
 Impurities in seed, 482.
 On pumice country, 597.
 On sand-areas, 364.
 Possibilities in New Zealand, 487.
 Testing, 247.
 Varieties, 490.
 Lupin, 370.

M.

Machine—
 Dressing of seed grain, 230.
 For destroying froth, 141.

Maize—
 Experiments, North Island, 284.
 Manure for, 560.
 Varieties, 560.
 Mammitis (contagious)—
 Cure of, 332.
 Examination of suspected milk, 567, 593.
 Management of the dairy cow, 582.
 Mangel—
 Crop at Ruakura, 108.
 Experiments, North Island, 287.
 Fertilizers for, 560.
 Keeping quality, 239.
 Substitutes, 566.
 Varieties, 196.
 Variety and manurial tests, South Island, 424.
 Manila abaca industry, 643.
 Manure—
 Analyses of manures used in co-operative experiments, 311, 314, 443.
 Basic slag and superphosphate, 332, 381.
 Basic slag, its application, 25.
 Basic superphosphate and bone-char, 195.
 Basic superphosphate, conversion of superphosphate into, 564.
 Biphosphate: New fertilizer produced in Norway, 137, 548.
 For barley, 193.
 For mangels and potatoes, 196, 560.
 For peas, beans, potatoes, wheat, oats, barley, and fruit-trees, 197.
 For roots, &c., 460.
 Heap in garden, 530.
 Importation of fertilizers, 44, 382.
 Liquid, 561.
 Mixing of fertilizers, 685.
 Phosphoric acid and phosphoric anhydride, 197.
 Phosphoric acid, relative value in guano and basic slag, 339.
 Potash salts, 336.
 Manurial experiments—
 At Lichfield, Auckland, 22.
 On Onekaka (West Coast, S.I.) soils, 71.
 With mangels, South Island, 424.
 With oats, South Island, 305.
 With potatoes, South Island, 311.
 With swedes at Ruakura, 33.
 With swedes, South Island, 538.
 With wheat, South Island, 299, 422.
 Manuring, green, 444.
 Market—
 (British) for hops, 507.
 (British) reports, 97, 205, 345, 469, 577, 693.
 China as a, 87.
 For meat, &c., Brazil as, 463.
 (Vancouver) for fruit, 511.
 (Vancouver) for New Zealand produce, 85, 189, 462.
 Marketing fruit, 21.
 McTaggart, A., 23.

Meat (frozen)—
 Argentine shipments to Great Britain, 96, 203, 343.
 Australian trade, 87.
 Combating prejudice in Germany, 187.
 French position, 188.
 Importation to Germany, 688.
 Improved cold-storage facilities at Port of London, 187.
 Mechanical analyses of soils, 219.
 Melon, cultivation of, 528.
 Mendelian theory of heredity, 207, 347, 686.
 Mendelism and potatoes, 370.
 Meteorological notes, 81, 184, 329, 452, 557, 682.
 Milk—
 Artificial, 640.
 Care and treatment of, 491.
 From aborted cow, 198.
 Household, 495.
 Production, food and, 42.
 Record Ayrshires, 144.
 Record Holsteins, 392, 635.
 Samples, sending to laboratory, 567.
 Sugar, 618.
 Testing in Scotland, 83.
 Testing in Sweden, 84.
 Milking-shed, race, and yards, plans of, 145, 260.
 Molasses, addition of, to ration of dairy cattle, 195.
 Moss and rushes, 458.
 Moth (blackberry-bud), 372.
 Mouldy butter, 506.
 Moumahaki Experimental Farm—
 Barley and vetches at, 614.
 Dairy herd, average returns of, season 1911-12, 395.
 Lambing at, 616.

N.
 Natal red-top experiments, 287.
 Necessity for testing rye-grass, 228.
 New manure (biphosphate) produced in Norway, 137, 548.
 New Zealand—
 Grass-grub, 370, 507, 579.
 Honey-shipment to London, 269.
 Wool exhibited at Royal Show of England, 218.
 Nitrogen-fixing bacteria, 238, 336, 337, 627.
 Nitrogen-inoculated soil, 247, 460, 561.
 Noxious weeds (see Weeds).
 Nutritive disorders of live-stock, 471.

O.
 Oat—
 Experiments in North Island, 176, 285.
 Manure for, 197.
 Rust-resistant, 600.
 Tests at Weraaroa, 521.
 Variety and manurial tests, South Island, 305.
 Variety test, South Island, 423.

Official Register of Merit of pedigree dairy stock, 254.
 Oil-tractor (Titan), 569.
 Onekaka manurial experiments, 71, 116.
 Onion, cultivation of, 86, 162, 163, 275, 526.
 Orchard—
 Cultivation, 56, 496.
 Monthly notes, 52, 270, 412, 522, 650.
 Plough (Harvey), 496, 686.

P.
 Packing fruit, 251.
 Pakihi soils of Westland: Drainage by explosives, 126.
 Parsnip, cultivation of, 273, 405, 528, 566.
Paspalum dilatatum, 568.
 Pasture—
 Dressing, basic slag as, 26.
 Experiments, 288.
 Pastures and crops, reports, 75, 178, 323, 446, 549, 673.
 Peach, peculiar development in, at Rukura, 613.
 Pea—
 Cultivation of, 60, 90, 162, 274, 526, 658.
 Experiments at Runciman, Auckland, 296.
 Field, 192.
 Inoculated soil from, 238.
 Manure for, 197.
 Trials at Patea, 74.
 Pedigree dairy stock, testing, 254.
 Pennyroyal, 685.
 Perennial rye-grass seed, 242.
 Pests of animals and plants (see Diseases).
 Philippine Islands—
 Abaca industry in, 643.
 Effect of typhoons on abaca-plantations, 642.
Phormium tenax (see Hemp).
 Phosphoric acid and phosphoric anhydride, 197, 339.
 Pigs, food for, 194.
Pinus insignis—
 Germination of seed, 561.
 Insect attacking, 564.
 Pit ensilage, 337.
 Plans—
 And specifications of cool-store for fruit, 508.
 Of milking-shed, race, and yards, 145, 260.
 Plant—
 Breeding, 138.
 Diseases, pests, &c. (see Diseases).
 Plough (Harvey orchard), 496, 686.
 Ploughs and ploughing, 360, 457.
 Poem on agriculture, 596.
 Poisoning—
 Blood, in sheep, 400.
 Rabbits, 602.
 Poor lands, experiments on, 22.

Post, fruit by, 653.
 Potash—
 Salts, 336.
 Sulphate of, for root crops, 460.
 Potato—
 Manure for, 560.
 Manorial, variety, and spraying tests,
 South Island, 311.
 Ruakura experience, 30.
 (Seed), necessity of proper selection,
 240.
 (Seed) of Up-to-Date variety, 562.
 Spraying, 198.
 Poultry-keeping—
 Artificial incubation, 419.
 Australian impressions, 66.
 Brooding questions, 170.
 Cleanliness, 169.
 Condiments, 169.
 Cool-brooder, 172, 536.
 Culling, 535.
 Danish methods, 67.
 Developing the layer, 667.
 Export trade, 64, 417, 536.
 General-purpose stock, 282.
 Hatching-period, 168.
 Importation of birds from Australia,
 65.
 Incubating troubles, 533.
 Influence of food on egg-colour, 665.
 Late-hatched stock, 534.
 Laying-type, 667.
 Market cockerel, 532.
 Marketing eggs, 669.
 Monthly notes, 64, 167, 280, 416, 532,
 665.
 Overcrowding, 532.
 Pedigrees of performance, 171.
 Poultry-rearing in Europe, 670.
 Poultry trouble, 563.
 Rearing under the hen, 170.
 Soft duck-eggs, 335.
 Table poultry, 665.
 Trial shipment of eggs to Vancouver,
 671.
 Vermin, 67, 418.
 Washing of eggs, 569.
 Prairie-grass, 477.
 Pregnancy in cows, guide to, 89.
 Preservatives in butter, Hawaiian regu-
 lations, 188.
 Preserving butter, 562.
 Produce—
 Imported into New Zealand, 94, 203,
 343, 467, 576, 692.
 Shipments from New Zealand to
 United Kingdom, 92, 200, 341, 464,
 572, 689.
 Protection of apple-trees from hares, 91.
 Pruning demonstrations, 272.
 Pumice country—
 Character of, 24.
 Lucerne on, 597.
 Pumpkin—
 As food for pigs, 194.
 Cultivation of, 528, 658.
 Pure seed, 213.

Purebred sheep, our, 594.
 Purity of seeds, importance of, 486.
 Purple sprouting broccoli, 663.

Q.

Quarantine of stock, 96, 202, 342, 468,
 571, 684.

R.

Rabbit-destruction, 193, 234, 602.
 Race (cow), plans of, 260.
 Radish, cultivation of, 275, 658.
 Ragwort, eradication of, 339.
 Rape—
 Compared with silver-beet, 338.
 Experiment in North Auckland, 294.
 Manure for, 338.
 Raspberry, cultivation of, 409, 531.
 Reclamation of sand-areas, 364.
 Red-clover seed—
 Dodder in, 400.
 Testing, 480.
 Red spider affecting the peach, 652.
 Red-water in cattle, 249.
 Reference-card of weed-seeds, 23.
 Refractory soils, experiments on, near
 Onekaka, 71, 116.
 Register of merit of pedigree dairy stock,
 254.
 Regulations governing importation of
 grain into Australia, 461.
 Reid, H. A., F.R.C.V.S., D.V.H., visit to
 Europe, 137.
 Reports—
 Of Trade Representative on Vancouver
 market, 462.
 On pastures and crops, 549.
 Returns—
 Argentine shipments to Great Britain,
 96, 203, 343.
 Breeding-ewes and lambing percentage,
 575.
 Hemp and tow graded, 93, 201, 465,
 573, 690.
 Of Department's dairy herds, 1911-12
 season, 395.
 Produce exported, 92, 200, 341, 464,
 572, 689.
 Produce imported, 94, 203, 343, 467,
 576, 692.
 Shipments from New Zealand to Van-
 couver and San Francisco, 95, 191,
 344, 466, 574, 691.
 Stock exported, 94, 202, 342, 467, 576,
 692.
 Stock in quarantine, 96, 202, 342, 468,
 571, 684.
 Stud sheep in New Zealand, 594.
 Rhodes-grass experiment at Redvale,
 Auckland, 287.
 Rhubarb, cultivation of, 60, 528.
 Rouging peas, 560.
 Root crops, use of basic slag for, 25.

Root-knot, crown-gall, hairy-root, 156.
 Roses, cultivation of, 62, 165, 410, 528.
 Ruakura Farm of Instruction—
 Dairy herd, average returns of, 1911–12 season, 395.
 Experience in potato-growing, 30.
 Grass plots, 216.
 Haymaking at, 559.
 Lucerne at, 499.
 Mangel crop, 108.
 Returns from cows at, 554.
 Rust-resistant oat, 600.
 Sale of lambs from, 554.
 Swede crop, 33.
 Rural exodus in France, method of checking, 106.
 Rushes, clearing land of, 458.
 Rust-resistant oat, 600.
 Rye-grass seed—
 Ergot in, 140.
 Perennial, 242, 685.
 Testing, 228.

S.

Sale of Weraroa Holstein yearling bulls, 255, 498.
 Salting haystack, 563.
 Sand-areas—
 Of no appreciable value for grazing, 336.
 Reclamation of, 364.
 San Francisco, shipments to, 95, 191, 344, 466, 574, 691.
 Sanitary feed-trough, 256.
 Scour in calves, 569.
 Sea-kale, 656.
 Seed—
 Distribution by Department, 194.
 Fine, growing, 460.
 Grass, 338.
 Importance of purity and germination, 486.
 Impurities in white clover, 134.
 Machine-dressing of grain, 230.
 Merchants of America, 197.
 Perennial rye-grass, 242, 685.
 Potatoes from Department, 460, 562.
 Potatoes, necessity for proper selection, 240.
 Pure, 213.
 Red clover, dodder in, 400.
 Testing, 228, 478.
 White clover, 499.
 "Seedy-toe" in horses, 459.
 Selection of seed potatoes, 240.
 Semi-official cow-testing, 39.
 Shearing (careless), effect of, on sheepskins, 615.
 Sheep—
 Blood-poisoning in, 400.
 Books on, 192.
 Breeding-ewes and lambing percentage, 1912–13, 575.
 Purebred, our, 594.
 Skins, damage to, through careless shearing, 615.

Shelter-trees—

Black wattle (*Acacia decurrens*), 199, 458, 459.
 Taupata (*Coprosma baueriana*), Akeake (*Olearia Traversii*), *Euonymus japonica*, *Eleagnus japonica*, *Escallonia rubra*, and tree-lucerne, 459.

Shipments of produce—

From Argentina to United Kingdom, 96, 203, 343.
 To United Kingdom, 92, 200, 341, 464, 572, 689.
 To Vancouver and San Francisco, 95, 191, 344, 466, 574, 691.

Shorthorn herd at Weraroa and Ruakura, returns, 1911–12 season, 395.

Siberia, dairy industry in, 390, 504.

Silver-beet—

Comparison with rape, 338.
 Experiments at Belfast, 235.
 Experiments, North Island, 285.
 For lamb-fattening, 456.
 In farm-garden, 656.

Manure for, 338.

Silver-blight, 685.

Slag (see Basic slag).

Slugs, 567.

Small-fruit, 408, 531, 659.

Soils—

Analyses of, 219.
 Inoculation by nitrogen bacteria, 238, 336, 337.
 Treatment, 29, 385.

Sorrel, control of, 567.

Soya bean—

Distribution by Department, 197.
 Experiments, 287.

Specifications of cool-store for fruit, 508.

Spinach, cultivation of, 527, 656.

Spraying—

Apple-trees, 199.
 Demonstrations, 272.
 Oil (emulsified), 460.
 Potatoes, 198.

Tests with potatoes, South Island, 311.

Stack-ensilage (see Ensilage).

Stallion law of Victoria, 23.

Still-born lambs, 564.

Stock—

Diseases, pests, &c. (see Diseases).
 Exported, 94, 202, 342, 467, 576, 692.
 Exports from Ireland to Great Britain, 331.

In quarantine, 96, 202, 342, 468, 571, 684.

Storage (cool) of fruit: Plans and specifications of store, 508.

"Stover," 336.

Strawberry, cultivation of, 165, 531.

Stud sheep in New Zealand, 594.

Subsoil breaking, 194.

Sulphate—

Of ammonia for potatoes, 560.
 Of potash for root crops, 460, 560.

Superphosphate—

And basic slag, 381.

Superphosphate—*continued.*

Conversion into basic superphosphate, 564.
For root crops, 460.
Swede turnip—
At Belfast, 237.
Crop at Ruakura, 33.
Discoloration of, 457.
Resisting club-root, 486.
Sowing with grass, 565.
Sweet-corn: Trials of varieties introduced from America, 287, 294.
Swiss chard experiments at Belfast, 235.

T.

Taupata (*Coprosma baueriana*), 459.

Tauranga Experimental Farm, fruit-culture at, 565.

Testing—

Cow (see Cow-testing).
Lucerne, 247.
Rye-grass seed, 228, 245.
Seed, 478.
Thousand-headed kale experiment, 290.
Titan oil-tractor, 569.
Tomato, cultivation of, 407, 528, 658.
Tow-grading returns, 93, 201, 465, 573, 690.
Tractor, oil, 569.
Trade Representative, report of, on Vancouver market, 189.
Trapping rabbits, 604.
Trial shipment of eggs to Vancouver, 671.
Trough, feed, 256.
Tuberculosis in cattle, 90.
Turkeys, yellow scour in, 563.
Turnip—
Cultivation at Weraroa, 114.
In farm-garden, 526.
On bush burns, 565.
Swede, discoloration of, 457.
Two crops on same land, 90.

U.

Utilization of poor lands, 22.

V.

Vaccine therapy, 105.

Vaginal passage of cows, douche for, 567.
Vancouver—

And San Francisco, shipments to, 95, 191, 344, 466, 574, 691.
Australian shipments to, 190.
Fruit-market, 511.
Market for New Zealand produce, 85, 189, 462.
Trial shipment of eggs to, 671.

Variety tests—

Mangels, South Island, 424.
Oats, South Island, 306, 423.
Potatoes, South Island, 312.

Variety tests—*continued.*

Swedes, Ruakura, 33.
Swedes, South Island, 538.
Wheat, South Island, 299, 423.

Vegetable—

Culture: Monthly notes, 58, 160, 273, 405, 524, 656.
Local market, condition of, 680.
Marrow, 658.
Venezuela, market for butter in, 444.
Vetches and barley at Moumahaki, 614.
Victoria—
New Zealand trade with, 96.
Stallion law of, 23.
Vine-culture under glass, 375, 607, 655.
Vineyard work, 415.
Virgil's "Georgics," 634.

W.

Waitaki Boys' High School agricultural class, 38.

Wallaceville Laboratory, examination of milk at, for contagious mammitis, 593.
Wattle, black (*Acacia decurrens*), 199, 458.

Weather notes, 81, 184, 329, 452, 557, 682.

Weeds (noxious, &c.)—

Eradication of bidabid and ragwort, 339.
Eradication on garden path, 563.
Foxglove, 566.
Pennyroyal, 685.
Seed reference-card, 23.
Sorrel, 567.

Weraroa Experimental Farm—

Dairy herd, average returns of, 1911-12 season, 395.
Sale of Holstein yearling bulls from, 255, 498.

Turnip crop, 114.

West Canadian markets—

Report of Trade Representative, 462.
Shipments to, 95, 191, 344, 466, 574, 691.

Western Wolths grass, 484.

Wheat—

Experiments, North Island, 286.
Feeding off, 340.
Manurial and variety tests, South Island, 299, 422.

White-clover seed, 134, 499.

Wolths (Western) grass, 484.

Wool—

London sales, 86, 694.
(New Zealand), exhibited at Royal show of England, 218.

Woolly aphis, 199.

Works on sheep-management, 192.

Wrapping-paper and mouldy butter, 506.

Y.

Yards (cow), plans of, 260.

ILLUSTRATIONS.

	PAGE
Hon. W. F. Massey, Minister of Agriculture : Frontispiece.	5
Waerenga Experimental Farm, showing Nursery, Vineyard, and Wine-cellar.	9
Warea Dairy Factory	5
Sunflower 4th (606), member of Mr. H. E. B. Watson's Jersey Herd, Taitapu	14
Cows discarded after being tested	15
Young Member of Weraroa Holstein Herd	18
Cattle on Pasture at Ruakura Farm of Instruction	20
Sturmer Pippin Tree in Mr. A. Allport's Orchard, Stoke	26
View showing Effect of Basic Slag as Top-dressing	31
Selected Potatoes at Ruakura Farm of Instruction	35
Demonstration of Effect of Manuring Swedes	37
Ruakura Farm of Instruction in the making	41
Ensilage-making on Farm of Mr. A. C. Pease, Eltham	43
Molina's General : Jersey Bull imported by Messrs. Bayly, Healy, and Hancock, Stratford	51
A Wairarapa Out-apriary	53
Fruit-laden Limb of Pear-tree in Mr. Kurtzhals's Orchard, Stoke	57
A Good Style of Vinery	101
Mr. W. C. Buchanan, M.P., Chairman of Agricultural, Pastoral, Stock, and Commerce Committee of House of Representatives : Frontispiece.	104
Effect of Ergot on Limbs of Steer	107
Romney Ram, Premier Lad, bred by Mr. W. Perry, Ponross	113
Eating off the Mangel and Turnip Crops at Weraroa Experimental Farm	115
New Empire Swede, prepared for Clamping	116
New Empire Swede, as grown at Weraroa	117
Effect of Manure on Onekaka Soils	122
Swede Crop at Weraroa : Typical Rows of New Empire variety	123
Bush Sickness—	
Bush-sick Beast	129
Healthy Beasts on Treated Pasture	131
Drainage by Explosives—	
View showing Top Soil removed, leaving Oxide-of-iron Pan	131
Excavated Face showing nature of Subsoil	140
Explosion Work in Progress	141
Ergot in Rye-grass Seed	142
Machine for destroying Froth	146, 147
Good Type of English non-pedigree Milking Shorthorn	154, 155
Plans of Cow-shed	157-159
Diagrams showing Arrangement of Bee-hives	161
Root-knot, Crown-gall, Hairy-root : Affected Roots	163
Diagram showing how Asparagus-root should be planted	
Samples of Brown Globe, Ailsa Craig, and Brown Spanish Onions	172
The Cool Brooder—	
Top View of Cool Brooder	173
Brooder showing Method of producing Warmth	173
Brooder with Run attached	173
Ruakura Farm of Instruction : The Homestead : Frontispiece.	209-211
Diagrams illustrating Mendel Theory	228
Necessity for Testing Rye-grass—	
Perennial Rye-grass, showing Germination of 10 per cent.	229
Perennial Rye-grass, showing Germination of 90 per cent.	231
Titan Oil-tractor at Ruakura Farm of Instruction	235
Belfast Co-operative Experiments—	
Sheep eating off Second Growth of Silver-beet	236
Buda-kale Plot	237
Typical Scene on Bush-sick Country	241
Up-to-Date Potato : Table and Seed Specimens	

	PAGE
Weed-seed Display of Department at Christchurch Poultry Show	243
Southdown Lambs at Ruakura Farm of Instruction	246
August Scene at Ruakura Farm of Instruction	251
Hay-stacks at Weraroa Experimental Farm	252
Unique Types of Swedes, showing Growth developing from Root-ends and Peculiar Malformations	253
Sanitary Feed-trough	256
Run through Milking-shed, Race, and Yards	260-262
Artificial Queen-bee Rearing	267
Peach-tree, "Mamie Ross," at Weraroa Experimental Farm	279
Conveying Milk to a New Zealand Dairy Factory: Frontispiece.	
Diagrams illustrating Mendel Theory	348, 351
Romney Ewes and Lambs at the Weraroa Experimental Farm	353
South Island Co-operative Experiments, 1911-12 Season—	
Banner and Universal Oats: Most successful in Tests	358
Velvet Chaff and Red Marvel Wheats: Most successful in Tests	359
Reclamation of Sand-areas—	
Typical Sand Country to be reclaimed	365
Lucerne on Sand: Moving and Loose Sand adjoining	366
Lucerne in Sand at Te Oranga Home, Burwood	367
Bacterial Nodules on Lupin-roots	369
Lupin-seedlings growing in Sand	371
Cultivation of the Vine under Glass—	
Diagram showing Arrangement of Vines	377
Diagrams showing Pruning and Planting	379
Danish Universal Regenerative Pasteurizer	386
Danish Dairy and Casein Factory	388
Siberian Butter-factory	389
Group of Danish Cattle	391
Landing New Zealand Butter in London Docks	393
Butter Warehouse at Ship's-side, London	394
New Zealand Butter in Germany	398
New Zealand Butter displayed in Italian Shop	399
Device for preventing Vermin climbing Wire-netted Fence of Poultry-yard	418
Incubator-room at Ruakura Farm of Instruction	420
Selected Swedes for Seed at Ruakura: Frontispiece.	
Certain Nutritive Disorders of Live-stock—	
Two Healthy Steers on Treated Pasture in "Bush Sickness" Country	473
Healthy Wether Sheep after Two Years' Grazing on Treated Pasture	475
Western Wolths Grass at Ruakura	485
Face of Nine-acre Lucerne Crop at Ruakura	488
Harvey Orchard Plough	496, 497
Herd-testing: Typical Cows in the Test	502, 503
Plans of Cool-store for Fruit	512-515
A Manawatu Flax-swamp Drain	518
Device for numbering Bee-hives	519
Asparagus Bed at Weraroa Experimental Farm, and Mr. W. H. Taylor, Horticulturist	525
Milton Cool Poultry-brooder	537
Nursery at Ruakura Farm of Instruction: Frontispiece.	
Grass-grubs—	
Anal Segments of <i>Odontria zealandica</i> and <i>Pyronota festiva</i>	581
Larva of <i>Pyronota festiva</i> ; Pupa of <i>Pyronota festiva</i>	583
Beetle of <i>Pyronota festiva</i>	584
Ruakura Farm of Instruction—	
Homestead, Office, and Stables; Cow-byre and Dairy	586
Interior of Cow-byre	587
Cows of Jersey Herd, Ruby's Buttercup and Mayflower	589
Young Member of Herd, Dominion Gem	591
Stud Rams at Farm	596
Ten Months' Root of Lucerne in Pumice Soil	598
High-type Southdown Rams, bred in England	599
Ruakura Selected Rust-proof Oat	601
Diagrams illustrating Vine-culture under Glass	608-613
Peculiar Development of Peach	613
Sheep-skin damaged through Careless Shearing	615
Ewes and Lambs on Green Crop at Moumahaki Experimental Farm	616

	PAGE
Illustration of Work of Blackberry-bud Moth	617
Rose Sugar Mangel Selected for Seed at Ruakura	625
Serradella Plant grown at Ruakura, showing Development of Bacterial Nodules ..	626
Original Type of Clydesdale, Sir Everard (5353) and Chrystal (5387) ..	628, 629
Australian and New Zealand Milking Shorthorn Cows at Weraroa ..	630
Ayrshires at Mounahaki: Cows, Saccharine and Mayflower, and Bull, Netherton Good Bonus	632, 634
Milk-record Holsteins imported by Department from America—	
Bull, Pietje 22nd's Woodcrest Lad, and Cows, Woodcrest Lady Maud, Ina Woodcrest de Kol, and Aggie Tehee de Kol	636, 637
Banana-lace	644
The Apiary—	
Solar Wax-extractor	648
Good Style of "Out" Apiary	649
Blossoms in Well-kept Domestic Orchard	651
Entrance to Nursery at Weraroa Experimental Farm	662
Purple Sprouting Broccoli	663

